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**INDIA**  
**METEOROLOGICAL DEPARTMENT**

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**METEOROLOGY**  
**OF THE**  
**PERSIAN GULF AND MEKRAN**

**By**  
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## ERRATA.

Pago.	Place.	For.	Read.
2	Line 31 . . . . .	may be described as the transition area.	more disturbed weather than winter. The neighbourhood of Gwadar.
12	„ 10 . . . . .	Mekram . . . .	Mekran.
19	„ 20 . . . . .	direction . . . .	directions.
23	„ 2 . . . . .	southwesterly southwesterly.	southwesterly southeasterly.
35	Column 49, Drigh Road, Upper Line.	Blank . . . .	3
52	Column 14, Muscat, Lower Line .	5 . . . . .	25
61	Percentage of observations at 1000 metres, column 5 km. per hour or less, Bait-al-Falaj.	Blank . . . .	10
62	Percentage of observations at 500 metres, column SW, Gwadar, first line.	51 . . . . .	15
62	Percentage of observations at 1000 metres, column SE, Gwadar, first line.	Blank . . . .	4
62	Percentage of observations at 1000 metres, column NW, Drigh Road, first line.	0 . . . . .	9
Figs. 2 to 8	Scale of wind velocity . . . .	80, 160 . . . .	8, 16

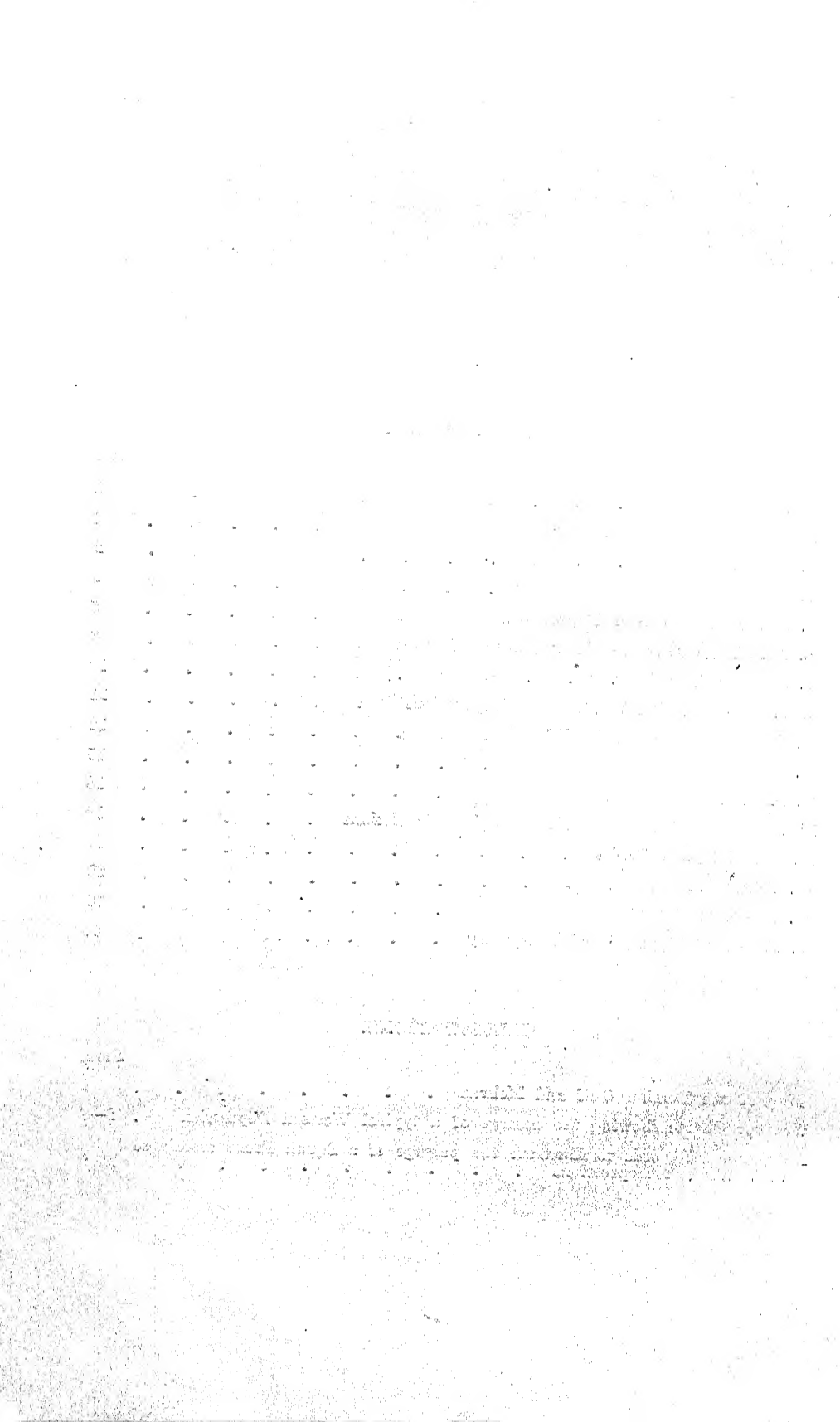


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# METEOROLOGY OF THE PERSIAN GULF AND MEKRAN.

By Dr. B. N. BANERJI, M.Sc., Ph.D., F.R.Met.Soc.

(Received on 23rd May 1930.)

## 1. INTRODUCTION.

Practically the whole region from the Persian Gulf to Karachi, with the exception of the southern coast of Baluchistan known as the Mekran coast, consists of and is surrounded by meteorologically backward countries where no meteorological services exist. Up to the year 1926, the information regarding the meteorology of the Persian Gulf and the Gulf of Oman consisted of the general description of the weather as experienced by navigators from time to time and described in the *Persian Gulf Pilot*, and the climatological summary of records of one observation a day for a very limited number of observing stations maintained by the India Meteorological Department with the help of the part-time services of officials of Political offices or of the telegraph department.

In the beginning of 1927, a forecasting centre was started at Karachi and a more elaborate organisation of weather observations from stations west of Karachi up to Bushire was undertaken. The number of observing stations was increased, the times of observation were made the same at all the stations, and two daily observations were arranged for. The code in use was changed in order to provide for the collection of more detailed observations. This new arrangement came into force about June 1927. After one year's working of the new organisation, the observers were instructed to note all details of disturbed weather in the form of a weather diary. The idea in starting the weather diary was to get the details of disturbed weather and to find out the characteristics of the various types of wind and weather known to the local people and also mentioned in the *Persian Gulf Pilot* by special names.

The remodelled data from improved organisation extend over a period of 2 to 3 years only. The period is too short for the preparation of an accurate climatological summary. An attempt has, however, been made to present a general summary of the meteorological conditions which control the weather over the section, supplemented by tables at the end giving the monthly mean values of available data to meet the rapidly growing needs of interested enquirers. Fig. 1 shows the names and positions of stations for which climatological data have been given in this paper.

## 2. GENERAL SUMMARY OF METEOROLOGICAL CONDITIONS.

Meteorological conditions over the section Persian Gulf to Karachi can be classified under two main distinct types, the winter and the summer. In winter, December to February, a tongue of the central

Asian high pressure or anti-cyclone extends into Persia and frequent depressions coming from the west regularly pass through this high pressure region. The marked variation of weather depends on the movement of these western depressions and also on the position and intensity of the central Asian anti-cyclone. In summer, June to August, a vast low pressure area extends roughly from N. W. India to Arabia and occasionally depressions moving from the east, after passing through India or the Arabian Sea, enter this low pressure region. The variation of weather is determined by the position and intensity of the low pressure area and also to some extent by these eastern depressions.

Besides the two well-marked summer and winter periods there are two transition periods. During the period September to November while the summer conditions change to winter type and during March to May when winter conditions change to summer type the characteristics of both types are met with. Their effects are not generally well-marked and only localised disturbed weather without regular sequence of events can be expected.

It will therefore be seen that, whereas during December to February the western disturbances are a regular feature of the weather, these really begin to appear from October and do not finally disappear till the end of May. The western depressions are entirely non-existent during June to August and the eastern depressions which include those coming from the Arabian Sea begin to affect the weather from May and finish off by November.

The different types of general meteorological conditions described above do not influence the weather over the whole section in the same way; and the whole route may be divided into two sections, the Persian Gulf including the Gulf of Oman, and the Mekran coast from Gwadar to Karachi. Over the first section the winter is the period of most disturbed weather, whereas over the second section summer is characterised by what may be described as the transition area.

Besides these the varying direction of the coast line and orographic features introduce local variations in the direction and force of winds, state of sea, vertical convectional phenomena including thunderstorms and bumpiness and incidence of fog.

### 3. WINTER PERIOD.

During this period when the sun is over the southern hemisphere the temperature over the great land mass of Asia is low and over the central Asian region the seasonal anti-cyclone develops, extending from Siberia to Persia; on the other hand a low pressure region associated with high temperatures develops over south Africa. This pressure distribution causes the outflow of air from the anti-cyclonic region as northeasterly winds in general. The high mountain range of the Himalayas forms a sort of barrier to the northeasterly currents. The winds move parallel to the mountain ranges on their northern and western edge descending through Persia and Afghanistan as northerly or northwesterly currents. By the time these currents reach the north Arabian Sea coast through Sind and the Mekran region their northeasterly characteristics reappear. Over the Persian Gulf the water surface, not being subject to the same

degree of heating and cooling as the land surface and being at a higher average temperature, an area of comparatively low atmospheric pressure forms. Further the sudden fall in elevation over Iraq from the Highland of Persia along a northwesterly to southeasterly direction helps the outflow from the main anti-cyclone to take a northwesterly direction from Iraq into the Persian Gulf, becoming more northerly over the Arabian side of the Gulf.

This general representation of conditions is so frequently interrupted by the passage eastwards of a series of depressions with complete reversal of wind currents and weather conditions that normal conditions do not generally last continually for more than 3 or 4 days at a time; as many as 8 western depressions can be traced following one after the other during a winter month.

#### 4. ORIGIN OF WESTERN DEPRESSIONS.

The name "western disturbance" was originally given by the India Meteorological Department to indicate such disturbances as come from the west and move eastwards. The study of detailed data shows that to give a picture of the nature and origin of the western disturbances it is necessary to begin with the modern conceptions of the depressions over European countries.

One of the most important and the earliest known phenomenon is the occurrence of periodic descent of cold polar air to lower latitudes and a corresponding rush of equatorial air towards northern latitudes, described respectively as polar and equatorial outbursts. Norwegian meteorologists have shown that the depressions of temperate latitudes are first formed at the meeting place between the polar and equatorial air and a line of separation of the two air currents can later be traced extending from the Arctic down to the temperate regions. Where the first encounter between the polar and equatorial air takes place, the depression that is formed is termed the parent depression. As this parent depression moves along northeastwards, on the line of separation various secondary conflicts take place between the different air masses resulting in the formation of other depressions. The other depressions are classified by the Norwegian Meteorologists as second, third, fourth, etc. of one family; two families being distinguished by the parent depressions which are formed after every primary outburst of polar or equatorial air currents. Besides these parent and various original members of an ideal family of depressions there are secondary depressions. These secondary depressions are generally formed when the members of the family are moving over hilly regions or are nearing the end of their activity. These secondaries, once formed, behave like any other depression; but as the name implies they are not original members of the family and, having come into existence through one of the original members, their importance does not often exceed that of the parent depression. The family of depressions along an extended front moves along northeastwards, with older members dying out at one end and new ones appearing at the other. Each succeeding depression of a particular family in its onward movement crosses a given meridian further south than its predecessor. As the origin of these depressions depends on the juxtaposition of two different air masses having different characteristic properties such as temperature and humidity, the intensity of the de-

pressions naturally depends on the degree of the contrast existing between the two air masses.

The depressions over the Mediterranean Sea coming as they often do from the Atlantic Ocean belong to the family of the depressions mentioned above. The Mediterranean depressions have been followed eastwards and it has been found that the "western disturbances" have the full family relationship with the former. When these original members of the family, coming from the Mediterranean Sea through North Arabia and Iraq, reach the mountainous countries of Persia and Caucasia, they develop secondaries which along with the original members of the family form the depressions which are now being considered.

To come to the specific condition existing over these regions, we find that, during the summer months, the pressure system over the globe with lowest pressure region over north-western India to Arabia helps the trade winds south of the equator to advance as steady strong south-westerly winds up to about latitude  $25^{\circ}\text{N}$ . in the Arabian Sea. The outbursts of the Polar air are mostly confined to comparatively higher latitudes, with the result that even the lowest members of the family of depressions do not reach the Persian Gulf latitudes and no depressions form. With the approach of winter and the gradual development of the central Asian anti-cyclone, conditions become increasingly favourable for the outbursts of polar air into central Asian region and of cold central Asian or Siberian air to extend to comparatively lower latitudes.

During mid-winter there is indirect evidence to show that some of the lowest members of the family form over the interior regions of Arabia, whence no meteorological observations are available. While one is watching on the daily charts a depression over Iraq and sees it passing away or fading off, preliminary signs of a depression may suddenly appear at Bahrein. On such occasions the Persian anti-cyclone is invariably found to have intensified considerably, thereby helping the cold air to descend through Persia across the Gulf to Arabia. These depressions move across the extreme north Arabian Sea towards central India and are about the lowest members of the family of western depressions.

In the *Indian Meteorological Memoirs*, Volume 21, part 7, *Rai Bahadur Hemraj* after examining rainfall statistics showed for the first time the continuity of the winter storms of northern India with the depressions moving across the Mediterranean Sea. In a later *Memoir*, Volume 24, part 11, *Sir Gilbert Walker and Dr. Kameshwara Rao*, while analysing the cold weather rainfall over the Indian area, indirectly classified the western disturbances under single type and double type. From the description already given about these winter depressions and from our knowledge that the average life and activity of depressions is about 3 to 5 days, it will be seen that the depressions that reach the area under consideration belong to the family of depressions already indicated and are not necessarily the same depressions as pass over the Mediterranean Sea. It will also be seen that the so-called western disturbances of the double type are nothing but the dying and the new members of a family or the parent depression and a secondary developed near mountainous regions.

## 5. NATURE OF WESTERN DEPRESSIONS.

It will now be shown that the structure of these depressions and the weather they bring over the region under consideration are also similar to those usually associated with the other depressions of the family over European countries, due allowance made for the geographical position of these regions.

The passage of an active depression is known to be attended with three distinct conditions of weather—the warm front stage, warm sector stage and the cold front stage. The “warm front stage” begins with the arrival of a different air mass generally warmer and often more humid than the normal existing air of the station which the former replaces. The new air being the lighter pushes the older air forward at the same time itself rising above the colder air. This stage is characterised by change of wind direction, rise of temperature, gradual condensation of the moisture of the invading air mass in the form of cloudiness, drizzle and fog. When the change of wind, temperature and pressure occur at a station, the warm front is said to be passing the station at that moment. From the nature of invasion of warm air it will be seen that the warm front is only the intersection of the inclined plane of separation between the two air masses at the surface of the earth. The inclination of this plane of separation is towards the direction of movement of the warm air so that at any particular station on the path of the depression the replacement of cold air by warm air will begin from higher levels and the approach of a warm front will be shown first by the appearance of cloud, change of wind and temperature at higher altitudes before the changes reach the ground. The cloudiness begins with cirrus and cirro-stratus type then changes through alto-stratus to stratus and nimbus with the passage of the warm front at the station. There may not be any cloud if the warm air mass is comparatively dry; then the passage of the warm front at the surface will be marked by change of wind and temperature only.

The second stage comes when the place in question is fully pervaded by the new air mass; this has been called the “warm sector stage.” There are no conflicting air masses and the weather is comparatively settled, with high temperature and humidity, along with a few passing clouds which are characteristic of the warm air mass.

The third stage, the “cold front stage”, comes when this newly established warm air mass begins to be replaced once again by a colder air mass. The invading air mass being cooler and generally drier than the air it replaces is the heavier and consequently pushes the warm air away lifting the latter upwards at the same time by acting as a wedge from below. This stage is characterised by a sharp and sudden change of wind direction, lowering of temperature, decrease of humidity, rise of pressure and, most important of all, by sharp convectional disturbances resulting in squalls, thunderstorms, duststorms, heavy showers, etc. It might be mentioned that unlike the effects at the warm front the replacement near a cold front begins near the ground and extends upwards, the plane of separation between the two air masses being in the opposite direction to that at the warm front. The manifestations of disturbed weather in general synchronise with the passage of cold front so that unlike the approach of a warm front the approach of a cold front is not

heralded long ahead by the appearance of cirrus clouds, etc.; but only cumulus and cumulo-nimbus clouds, sometimes in long bands, appear a short time before the passage of the cold front over the station. With the passage of the cold front the effect of the depression soon passes away and weather again settles down to normal.

Coming to the actual conditions over this region it will be seen that when a depression is approaching Iraq or the Persian Gulf through Arabia the normal dry cold northwesterly winds over Iraq and upper Gulf regions change to some direction between SE and SW. In the early stage these SE to SW winds may only consist of the existing air over these regions and consequently there may not be appreciable discontinuity in the atmosphere and the weather may remain fine and clear for sometime. Soon afterwards the SE to SW winds form part of the air mass from southern latitudes of Arabia and the Persian Gulf. This air mass being warmer and more humid is in marked contrast with the original retreating air over these parts and the characteristics of the "warm front" in advance of the approaching depression are shown. Clouds beginning with cirrus and cirro-stratus type gradually lower, temperatures begin to rise, wind changes to some direction between SSW and ESE and drizzle or fog may occur.

Over the Persian coast of the Gulf, due to the presence of the coastal line of hills and mountains, the ascensional movement of the southeasterly warm air of the warm front is greatly intensified and the hills also help to retard the retreat of original colder air, thereby prolonging the interaction of dissimilar air masses in their neighbourhood. Because of these orographic effects occasionally instead of drizzle heavy rain may be associated with the approach of a warm front and the period of cloudiness with occasional drizzles, which should normally pass away with the passage of the warm front, persists for a prolonged period.

After the passage of the warm front and before the arrival of the cold front the SE to SW winds of the warm sector generally give fair weather, little wind and cloudiness characteristic of warm sector away from the coast, but as mentioned in the earlier paragraph the orography of the coast line of Persia helps the persistence of cloudy to overcast skies with intermittent drizzle in that region.

When the depression in its eastward movement passes into Persia or into the Persian Gulf through Iraq or Arabia the ESE to SSW winds which formed part of the warm sector get replaced by cold northerly to westerly winds. This cold wind advances with the usual characteristics of a "cold front" such as sharp fall of temperature and humidity, change of wind direction generally associated with squalls of gale force, thunderstorms, sandstorms, etc. After the passage of the cold front the weather rapidly improves, becoming bright and clear. Over the sea area, the strong winds help to produce long waves over the water surface. These waves in the form known as 'swell' travel very much faster than the cold front, so that when the cold front first begins to affect the extreme northern section of the Persian Gulf, the heavy swell radiating from the head of the Gulf reaches other parts of the Gulf before the arrival of the squall front; this is often a useful indication of the approach of disturbed weather for ships and seaplanes.

The interval between the arrival of the warm front and the following cold front is between 12 to 36 hours; the longer periods generally occur

over the Persian Gulf section and shorter periods eastwards, except near Gwadar region which is on the base of the line of mountains running SW to NE along the Indian frontiers.

The cold front which is the same as the squall line is in general inclined in a direction from NE to SW. This squall line advances eastwards at different rates depending on the pressure gradient behind but on an average one may expect the squall line to reach Jask from Bushire in 36 hours. Occasionally the squall line even extends in some north-westerly to southeasterly direction; in such rare cases the cold front phenomena appear over the whole section from Bushire to Karachi within 12 to 24 hours.

The western depressions on their eastward march are vigorous over the Persian Gulf and decrease in intensity eastwards until they reach the Indian frontier, where once again vigorous effects are noticed over N. W. India. This behaviour can be explained because over the Persian Gulf the contrast between the fresh cold air from the northwest and the southeasterly winds from the Arabian Sea and the Persian Gulf is very well-marked and the depressions are vigorous over the Iraq and Persian Gulf region. The same cold air mass while travelling through the Persian Gulf loses part of its characteristics and when it arrives over Oman and Mekran, generally the contrast between it and the local air which is also cold being partially of Persian origin becomes less marked; the intensity of the resultant weather phenomena is therefore small. Over N. W. India the conflicting air masses are of Arabian Sea and Siberian origin, consequently once again the contrast becomes great and the activity of the depressions becomes vigorous.

I give below my actual experience of one of these winter depressions over the Persian Gulf and at Bushire between 20th to 25th January, 1929, when I happened to watch its progress.

Towards the afternoon of the 20th after leaving Bahrein on S. S. "Barpeta" for Bushire some low clouds were visible but soon after the clouds appeared in patches till the evening of the 21st January when the clouds thickened and the sky became overcast, with occasional drizzle. We reached Bushire harbour on the early morning of the 22nd and found weather conditions similar to those of the previous evening, i.e., overcast with occasional drizzle. The clouds were of stratus type, temperature was high and wind and sea were calm. This state of weather with light easterly surface wind towards the morning of the 23rd lasted till about 10.10 GMT of the 23rd. It will therefore be seen that with the passage of the warm front over the Gulf, Bahrein and the Gulf regions far away from the north coast had patchy clouds characteristic of a warm sector. But at Bushire, due to orographic conditions as has already been described, the period of overcast and drizzling weather was considerably prolonged and in fact lasted from the time of approach of the warm front about the morning of the 21st to 10.15 GMT of the 23rd, the time of arrival of the cold front.

At about 10 GMT I heard a roaring sound from inside the room of the Consulate and saw from the roof of the Consulate foam crested sea waves and a sheet of rainfall approaching, the place where I was standing was still being affected by light easterly winds. At 10.15 GMT strong northwesterly winds and a sharp shower came over the station

simultaneously. The dry bulb temperature dropped and the observer of the station sometime after came to inform me that the wet bulb was showing considerable difference from the dry bulb readings; this was not the case sometime previously. Of course the explanation is that the cold air was much drier than the previous warm humid air. Towards the evening the clouds became patchy and the sky was perfectly clear at night. This is the characteristic passage of a cold front over the Gulf.

During the next three days of my stay at Bushire, 24th to 26th, rough seas, cold moderately strong northwesterly winds with slight diurnal variation, clear skies and excellent visibility prevailed.

## 6. ACTUAL WEATHER CHARTS AND SQUALL RECORDS.

Actual weather charts, prepared at Karachi and showing the passage of a typical western depression during the period 16th to 19th December, 1929, have been given to illustrate the various characteristics mentioned earlier.

Over the Persian Gulf where the different stages of the depressions are often well-marked, there are unfortunately no records of autographic instruments yet available. But the autographic records of Drigh Road observatory for 27th, 28th November, 1928 have been given in Fig. 9 to illustrate the passage of a squall front associated with the western depressions.

To enable the reader to understand the illustrations a few notes are given below:—

*Weather charts (Figures 2 to 8).*—The charts have been prepared from observations taken twice daily. The morning charts contain observations taken at 0400 GMT over the region extending from Long.  $50^{\circ}$  to  $67^{\circ}$ E, at 0600 GMT over Iraq, at 0800 hours local time over Egypt and India equivalent to about 0600 and 0300 GMT, respectively. The evening charts contain observations taken at 1400 GMT over the section from Long.  $50^{\circ}$  to  $67^{\circ}$ E, at 1200 GMT over Iraq, at 1130 GMT over India. The surface observations are obtained by telegrams in different codes but all the data have been plotted with symbols having the same meaning.

For every hour of observation two charts have been given. The first chart shows all surface observations that are available from the stations with isobars and fronts drawn on them. The second chart shows the wind directions and velocities at different heights as obtained from pilot balloon stations and reports of direction of movement of low clouds at a few other stations with isallobars showing changes of pressure during the past 24 hours.

The method of plotting surface observations will be best shown by taking an actual example. Referring to the first chart of 0400 GMT on 17th December, the data plotted against Bushire are pressure reduced to sea level and constant gravity 29.86 inches, visibility 8 on scale, air temperature at the time  $67^{\circ}$  Fahrenheit, nine-tenths of the sky covered with cumulus cloud, moderate intermittent rain started one to two hours previously, humidity 80 to 89 per cent., past weather rain, wind direction south force four on Beaufort scale, sea rough and total rainfall since last observations, (1400 GMT of 16th), between 0.18 to 0.37 inch. The shaded portion of the circle to which the wind line is directed represents cloud amount. Besides this general method of representation the differ-

ent kinds of weather are in general represented by the following symbols:—

≡	Fog or mist.	●	Rain.
∞	Dust haze.	*	Snow.
≡	Fog or mist or dusthaze.	△	Hail.
☂	Passing showers.	⚡	Thunderstorm.
☔	Drizzle.	↓	Line squall.

The value of the isobars is indicated against the lines and these have been drawn as thick continuous lines after making some allowance for different times of observation and unreduced pressure reports from hill stations.

The other lines have the undermentioned meaning:—

x x x x x x x	Cold front.
— — — — —	Warm front.
—————	Occlusion—showing the persistence of discontinuity in its last stages in the upper regions after being obliterated from the surface.
.....	Line of separation of two different air masses where fronts are liable to develop.

Isallobars are drawn in thick continuous lines and the values of pressure changes are indicated against the lines.

Over Iraq and Egypt the upper wind velocities and directions are given at 1,000 feet intervals and figures such as 1, 2, and 3 represent 1,000, 2,000, and 3,000 feet above ground respectively. Elsewhere the figures represent kilometers with .5 representing .5 kilometer above station level and other heights such as 1, 2 or 3 representing kilometers above sea level.

The dotted lines showing cloud movement represent only the direction.

*Squall records (Figure 9).*—The figure shows the records of autographic instruments during the passage of two squalls at 1920 I. S. T. on the 27th and at 0245 I. S. T. on the 28th arranged in the following order:—

(a) Velocity trace from Dines pressure tube anemometer with its head 50 feet above ground at Drigh Road.

(b) Direction trace from Beckley anemograph at Manora observatory with the vane 36 feet above the ground; the direction pen of the Dines Pressure Tube Anemometer was unfortunately out of order.

(c) Temperature record from a daily thermograph inside a Stevenson Screen; the lower trace corresponding to the wet bulb temperature is to be ignored as it was under test.

(d) Pressure record from a weekly microbarograph.

(e) Rainfall record from a weekly raingauge; it is not an actual copy of the original chart but has been drawn on a different scale to suit the diagram.

## 7. SUMMER PERIOD.

With the advance of the sun to northern latitudes the air gets heated over the land masses of the northern hemisphere. The cold weather period with its high atmospheric pressure over Asia begins to break up and a low pressure area develops over the region extending from North-West India to Arabia. The water surface of the Persian Gulf being less heated than the land masses all round, the air over it is comparatively cooler and the Persian Gulf region forms a sort of high pressure area within the seasonal low extending from North-West India to Arabia. The resulting pressure distribution shows a detached low pressure area over south-east Arabia. The seasonal low pressure centre induces the southeasterly trade winds below the equator to advance as steady south-westerly winds over the Arabian Sea. These winds are called the Arabian Sea monsoon winds. The monsoon winds blow over the whole of the East Arabian Sea and having passed over the sea through regions of increasing temperature these winds contain a great amount of moisture. These monsoon winds on reaching India give rise to much rainfall, and cloudy skies and during their passage over the sea also cause rough seas and heavy swell.

Over the Arabian Sea up to about latitude  $20^{\circ}\text{N}$ . the main monsoon current is steady southwesterly. North of latitude  $20^{\circ}\text{N}$ . on the western half of the north Arabian Sea the southwesterly monsoon winds try to enter into the cyclonic circulation around the low pressure area over south-east Arabia; the monsoon winds thus follow the trend of the Arabian coast and enter the Gulf of Oman and the Persian Gulf as southeasterly winds. On the eastern section of the north Arabian Sea the monsoon maintains its southwesterly direction and reaches east Mekran and the Sind Coast.

In general however the low pressure centre over North-West India and Persia is more pronounced and in accordance with the laws of wind circulation northwesterly winds prevail over most of the Gulf during the summer months. The southeasterly deflected monsoon being under the influence of two low pressure centres is normally quite gentle and does not penetrate far into the Persian Gulf.

The wind data contained in the tables at the end will show clearly that whereas Pasni shows predominating W to SW wind during June, July, and August, Gwadar shows south and Muscat, Jask, Lingeh, Henjam southeast; Bushire and Bahrein show northwesterly winds. Depending on the position and intensity of the two centres of low pressure one can sometimes see southeasterly winds over the Arabian side of the Gulf and northwesterly over the Persian side of the Gulf.

These northwesterly winds of the Gulf and the Arabian Sea monsoon winds being dependent on the seasonal low pressure centres, the variation in the intensity of the latter determines the variation in the force of these winds. The intensification of the low pressure centre over the Persian section causes a gradual strengthening of the northwesterly winds rising occasionally to gale force and gradual falling off to gentle breeze with the weakening of the low pressure; a similar effect is noticeable on the monsoon winds. It should however be pointed out that the northwesterly gales during these months work up gradually and do not

set in abruptly like those experienced during the winter months behind a passing depression.

The variation in the intensity of the low pressure centre may either be brought about statically by variations in the solar heating of the atmosphere or dynamically by the movements of air currents due to passage of depressions. For the first there is very little material for discussion but as regards the second, depressions moving westwards or north-westwards from the Bay of Bengal, the Arabian Sea and sometimes from central India have been found to affect the region under consideration. These summer depressions are being described later as eastern depressions.

## 8. NATURE AND EFFECT OF EASTERN DEPRESSIONS.

*Bay of Bengal depressions.*—By April, the equatorial air over the extreme southern section of the Bay of Bengal advancing as southwesterly winds encounters the prevailing northeasterly winds of the Bay. This encounter of different air masses results in the formation of depressions over the lower latitudes. These depressions when passing over the sea area often develop into storms and generally move in some northerly to northeasterly direction. With the gradual advance of the season the southwesterly winds reach higher latitudes, and the place of encounter of the conflicting air masses that give rise to the depressions and storms is also shifted to higher latitudes. The direction of movement of these storms and depressions also changes gradually from northeast through north to north-west and west. In June the Bay depressions generally form above lat.  $16^{\circ}\text{N}$  and move north-westwards. In July and August the depressions form over the extreme head of the Bay of Bengal and follow a west-northwesterly course. In September conditions are similar to June. October and November are similarly comparable to conditions in May and April. A full picture of the place of origin and movement of storms can be obtained from '*Storm Tracks in the Bay of Bengal*' compiled by Dr. Normand in the Publications of the India Meteorological Department.

From the above description it will be seen that during the months of July and August and to a lesser degree in the months of June and September, depressions originating over the Bay of Bengal cross the Bengal and north Madras coasts and move westwards through India.

An eastern depression formed at the head of the Bay of Bengal by the interaction of Bay monsoon current and land air has sometimes been found to die out over Central India or the United Provinces. This dying depression after existing more or less in a stationary state may lead to a fresh depression over the Rajputana region at the meeting place of the fresh Arabian Sea monsoon air and the land air which is the old and modified air from the Bay of Bengal. Such a fresh depression, once again vigorous, has been found travelling westwards or north-westwards towards Sind where the high mountains of the north-western frontier partially constrain it to move in a more northerly direction parallel to the line of mountains. Along with the partially constrained movement of such depressions on the eastern side of the frontier hills there is often the evidence of a portion of the depression moving further westwards to Persia and even to Iraq.

These eastern depressions when they are over north-west India induce an inflow of the Arabian Sea monsoon current which because of its moisture content maintains the activity of the depressions whereby cloudy weather, stormy winds and rainfall occur over Sind and the extreme eastern section of the Mekran coast. Beyond the frontier hills the depressions induce an inflow of westerly and northwesterly hot winds coming from Arabia, Persia and Iraq. These northwesterly winds being dry, the energy of depressions is not maintained, precipitation usually associated with depressions become insignificant and only duststorms occur over the Persian Gulf section and the west Mekran coast. Occasionally however rainfall occurs over the Northern hilly sections of Persia such as Meshed, Teheran and Ispahan due perhaps to the penetration of Indian Monsoon Current on the North-eastern side of these eastern depressions passing through Persia.

Sometimes an eastern depression moving westwards passes through Sind or Gujarat into the north Arabian Sea, off Mekran. These depressions cause heavy rain, rough seas, squally weather over the Pasni-Karachi section, light-passing showers, duststorms, rough seas and squally weather up to the Gulf of Oman and thunderstorms over the hilly section of the Province of Oman west of Muscat. Over the Persian Gulf nothing but duststorms occur even on such occasions.

*Arabian Sea Depressions.*—Like those of the Bay of Bengal the Arabian Sea depressions and storms before and after the establishment of the monsoon have their origin at the places where the southwesterly monsoon current meets the northeasterly current, and during the monsoon period itself at the places where the fresh revival of the monsoon begins after a temporary period of withdrawal or inactivity.

The origin of these depressions during the period before and after the establishment of the monsoon is far south near the equator; these travel to higher latitudes moving in different directions and develop over the sea into tropical cyclones which really come under the weather conditions of the transition period where further mention will be made.

From June to September when the Arabian Sea monsoon is affecting India there are oscillations of the intensity of the monsoon. It has been noticed that after a temporary inactive monsoon period the revival of the monsoon generally occurs with waves of low pressure or depression moving in advance. These monsoonal depressions generally have their origin off the Bombay coast and show a tendency to move in some north-north-westerly direction; these depressions may sometimes break up into secondaries entering India near Gujarat and also continue to move in a more westerly direction reaching the extreme north Arabian Sea and the Gulf of Oman before entering Persia or Baluchistan. Although the depressions cause strong revival of heavy monsoon rain over the Indian area they are not strong enough to divert the main monsoon current towards west Mekran, and comparatively drier air from inland area enters into the depressional region. Marked cyclonic circulation of ground and upper winds, squally and overcast weather, occasional slight passing showers, duststorms, rough seas and heavy swell often follow the passage of these depressions into Persia. Thunderstorms are known to occur over the hills of Oman region.

## 9. CHANGE OF SEASON PERIODS.

During the change of season period, March to May, the western depressions gradually lose their importance because of their recession

to higher latitudes. The heating up of the air is effected under quieter wind conditions and consequently there is a general tendency for the formation of localised afternoon disturbances of the convectional type such as thunderstorms, duststorms and bumpiness. When therefore the influence of a passing western disturbance, far away from the Persian Gulf, synchronises in time with the maximum convectional conditions of the afternoon, sharp thunderstorms and squalls may occur at a station but a neighbouring station may not be affected at all. Occasional storms and depressions form in the Arabian Sea and move towards higher latitudes displacing the northeasterly winds by the south-westerly monsoon winds over the Arabian Sea and the Indian regions. These storms like the usual tropical cyclones generally have a well-marked central region of bad weather. They do not all move in the same direction, but they have a general tendency to north-westward movement and some of them reach far enough north to affect the Mekran coast. Because of the concentrated nature of the storm area a severe storm may be passing over a particular place without materially affecting the weather at neighbouring stations.

Similarly during the months of September to November the monsoon winds begin to retreat towards the equator and the eastern depressions begin to get unimportant. Occasionally storms form in the Arabian Sea as the last efforts of the monsoon currents to keep themselves alive by encounters with the NE winds that begin to develop over land area. The western depressions of the winter period begin to show their existence at higher latitudes with increasing tendency to reach lower latitudes. Here again the result is similar to the earlier transition period with the occurrence of sharp occasional localised disturbed weather without apparent orderly progress of weather from place to place. The Arabian Sea storms moving westward or north-westwards usually enter the south Arabian coast far away from the Mekran coast, but occasionally one or two have been found to reach the Gulf of Oman. During this period when the humid monsoon air is being gradually replaced by dry cold currents, and there is marked night cooling, dew and fog are frequently formed.

The characteristics of these two periods are generally a mixture of those of summer and winter and except for scattered and localised disturbances which are very few in number, the weather condition is generally settled from the point of view of sea and Air Navigation.

*Arabian Sea Storms.*—Unlike the Bay of Bengal which is surrounded on all three sides by observing stations and is frequented by ships taking different routes all over the Bay of Bengal, the Arabian sea is only represented on its eastern side by a number of observatories extending from Colombo up to Karachi. Until three years back there were very few observing stations west of Karachi and practically none over the Arabian Coast; there are also regions where ships seldom go. Consequently, it is not possible to make an exhaustive study of all the storms and their full tracks. The tracks of all important storms up to the year 1925 for which some data are available are given in the India Meteorological Publication '*Storms tracks in the Arabian Sea*' by Dr. Normand. It will be seen that the general direction of movement of these storms is between north-westerly to westerly with occasional tendency to recurve to north-east towards the west coast of India.

There is a general feeling that the storms in the Arabian Sea seldom reach the Mekran coast but looking at the history of previous known storms one can see that the number of occasions during which Arabian Sea storms have been near or have passed over the Mekran coast bear comparison with the number of storms that have entered the west coast of India. Of course it should be made clear that the storms generally lose part of their energy as they move to more northerly latitudes, but the state of the sea and the strength and direction of upper air currents which constitute difficulties for sea and air navigation appear to continue well-marked.

In view of the difficulty of generalisations on meagre data and as the storms of the Arabian Sea can be very destructive a very brief mention of the different storms that have been known to affect the section between Karachi and entrance to Persian Gulf are given below. There are others which can be classed as minor depressions of which a few can also be traced moving towards the Mekran coast but no special mention of these appears necessary.

1.—3rd Week of April, 1847—Severe storm appears to have entered the Gulf of Oman in the neighbourhood of Muscat with all the attendant severe weather of a tropical cyclone.

2.—May, 1871—Storm in the Arabian Sea far from coast appears to have caused moderate south-westerly gale and heavy sea and swell over Mekran.

3.—3rd Week of June, 1872—Severe storm gave easterly gale and rain along the whole coast westwards up to Charbar.

4.—3rd Week of May, 1886—Severe storm apparently entered Mekran coast near Gwadar. Data unavailable but rapid fall of pressure with strong surface winds occurred at Karachi and Quetta.

5.—2nd Week of June, 1889—Storm moving westerly parallel to Mekran coast passed Muscat on 10th where it caused considerable damage.

6.—1st Week of June, 1890—Storm moving north-westwards entered Gulf of Oman with heavy gale and rain squalls at Muscat and Jask.

7.—2nd Week of June, 1890—Moderate storm travelled along the west coast and between 18th to 22nd moved parallel to the Mekran coast as shown by the very low pressure over Jask and Muscat. It is not known what kind of weather it caused along the Mekran coast.

8.—1st Week of June, 1898—Severe storm moved due north along the line Muscat-Jask and did considerable damage.

9.—1st Week of May, 1901—H. M. S. "Sphinx" encountered north-east wind, force 11, at latitude  $25^{\circ}$  North and longitude  $63\frac{1}{2}^{\circ}$  East on the evening of the 3rd. Telegraphmaster, Ormora, reported terrific storm there on the morning of the 4th. Karachi reported south-west severe gale on the 4th and gale on the 5th. Muscat and Jask showed by the reversal of wind from east to west the movement of the storm into Mekran.

10.—2nd Week of May, 1902—Severe very concentrated storm passed inland just east of Karachi where wind reached 60 miles an hour from north-east. The storm was very concentrated and caused considerable damage along its path but apparently did not materially affect the weather west of Ormora.

11.—3rd Week of June, 1902—Severe concentrated storm. "Patrick Stewart" showed fall of pressure of .35" whereas at the centre the fall was over .7". A steamer involved in the storm running between Bombay and Karachi located Ras Ormora experiencing SSW hurricane there and Karachi was having SE hurricane. This evidence indicates that the severe storm crossed the Mekran coast between Ormora and Pasni and must have caused very severe weather there.

12.—3rd Week of June, 1903—Storm had hurricane winds near its centre about 150 miles south of Gwadar on the 17th morning. It was a concentrated storm and for want of information it is difficult to say how it affected the Mekran coast. It is stated that it did not materially affect Muscat-Jask region but at that time there was no observing station between Karachi and Jask, Karachi showed easterly winds and Jask and Muscat slight fall of pressure.

13.—1st Week of June, 1907—Severe storm gave 76 miles per hour gale over Karachi, passed inland west of Karachi moving northwards.

14.—2nd Week of June, 1907—Storm over extreme northeast Arabian Sea caused severe weather over Sind and Mekran coasts.

15.—1st Week of September, 1926—Moderate storm gave very bad weather at Karachi and slight drizzle at Pasni and gales off the east Mekran coast.

16.—3rd Week of September, 1926—The storm moved northwestwards weakening and at the same time causing rough seas and strong winds off Muscat and the head of the Persian Gulf. This fact along with negative pressure changes over Muscat and Jask and interior Persia indicates the entry of the depression into Persia by the 21st.

17.—2nd Week of November, 1929—A storm entered as a depression moving northwestwards into Persia through Oman region. It gave widespread rain from Karachi to Gulf of Oman,  $1\frac{1}{2}$ " at Muscat. Disturbed cloudy weather lasted 2 or 3 days but no gales were reported from land stations.

## 10. PREVALENT IDEAS OF THE WEATHER.

The collection of disjointed weather information without the aid of scientific study based on synoptic observations and also conflicting ideas indicated by special local terms always tend to magnify the extent of the dangerous nature of the weather and of the helplessness of the people to foresee their approach.\* It is no wonder therefore that when talking of the Persian Gulf region there is a general tendency to a sense of alarm at the vagaries of weather there. So far the chapter on weather published in the *Persian Gulf Pilot* has been the most valuable collec-

\* It may also be of interest to give an extract from the weather diary of one of the observers in the Persian Gulf. "20th February 1930—Hour of commencement 18-30 GMT and hour of ending 20-30 GMT. Believe high winds came on with velocity of about 20 miles per hour and sea was very rough so much so that people who boarded the mail steamer were inclined to remain on board and proceed to other ports for fear that the sailing boats may capsize. This storm, I believe, lasted for about 2 hours but unfortunately I knew nothing about it (being asleep). However, I may mention that this is a very bad place for exaggeration and I am quite sure that the storm was not as heavy as reported, for even a sound sleeper like myself would be aroused if a really good storm occurred. In support of this statement I may mention that there are hundreds of matting huts here in which the poor people stay and none of them were blown down. There was nothing whatever the next morning to indicate that there had been high winds over night."

tion of the experiences of local people and of the mariners sailing over the section between Persian Gulf to Karachi. This chapter may profitably be read for a better understanding of the significance of the remarks that now follow.

**Shamal.**—Over the Persian Gulf and Mekran people give the name Shamal to any kind of northwesterly winds which may either be the normal wind or be of gale force associated with depressions. There is also a tendency among some people, generally foreigners, to restrict the name Shamal to abnormal wind forces associated with disturbed weather. Terms like strong, moderate and light shamals are also used. This indefiniteness in the use of the word is noticeable in the description of winds in the *Persian Gulf Pilot*. The Shamals can be classified under three different types.

From what has been said already about the characteristics of western disturbances it will be seen that those winter Shamals, which are described as coming suddenly, sometimes associated with thunderstorm and rain, are the squalls characteristic of the passage of cold fronts behind a depression. These northwesterly squalls come with reversal of wind direction and bring about thunderstorms and rain, which pass off rapidly; and dry cool weather with good visibility generally prevails afterwards. These northwesterly squalls are associated, in the usual way, with rise of barometric pressure and the worst weather occurs soon after the beginning. The time of occurrence of squally shamals is dependent on the progress of the winter depressions and as such these may reach any particular station at any time during day or night. On an average a well-marked squally shamal in its eastward march through the Persian Gulf reaches Jask in about 24 to 48 hours from the head of the Gulf and then if it continues to remain effective takes another 24 to 36 hours to reach Karachi. These squally shamals are northwesterly over the western half of the Gulf and are more westerly towards the eastern half and Mekran coast.

At individual stations and over ships at sea the warning for shamal of this type will be the falling tendency of barometer a day or two previously but not at the time, rise of temperature with southeasterly to southwesterly winds, and cloudiness changing from high clouds to low clouds. The indications from clouds though generally satisfactory over land stations is not very satisfactory over the sea where as already mentioned there may not be much cloud during the warm sector stage of the depression, a stage which immediately precedes the appearance of the squally shamal.

The second type of strong northwesterly wind described as shamal lasting for a longer period, sometimes up to a week, with strongest winds towards the middle of their existence are not usually the depressional shamals of the winter months. This type of shamal occurs during the summer months due to the intensification of seasonal low pressure areas over the region Persian Gulf to N. W. India as described earlier. These shamals occasionally rise to gale force gradually, not by a squall with reversal of wind, and also fall off gradually with the return to normal state of the seasonal low pressure. These strong, gusty winds carry sand and dust from far off regions reducing the visibility consi-

derably, but are scarcely ever associated with thunderstorms or sudden squalls.

The third type of shamal described as blowing over the Gulf for 9 months of the year and the so-called 40 days' shamal are nothing but the normal prevailing winds over the Gulf.

It will therefore be seen that a general description of the harmless type of normal wind with the boisterous winter squalls is liable to give the impression that bad weather lasts almost the whole year whereas only a few really bad shamals of the line squall type occur during the winter months and give reasonable notice of their approach.

**Kaus and Suhaili.**—Local people give the name Kaus to southeasterly or easterly winds and Suhaili to southwesterly winds.

During summer near the entrance to the Persian Gulf and over the west of the Mekran coast southwesterly to easterly breezes are quite normal and being part of the deflected monsoon current are generally humid and occasionally cause cloudiness. During winter however these winds usually precede the depressions and secondaries.

From the description of western disturbances given earlier it will be seen that Kaus and Suhaili, stated to be associated with the appearance of cloud and warm moist gloomy weather and falling barometer, represent the advancing warm front stage of the depression. The winds gradually strengthen and the weather also gets gloomier with rain or passing drizzle but the disturbed weather is of a milder type than those of squally shamals.

Winter Kaus or Suhaili, unlike Shamals, are strongest towards the end of their existence and occasionally attain gale force after blowing as moderate to fresh breeze for at least 12 hours previously. Wet and cloudy weather during Kaus and Suhaili may last for a prolonged period and is generally followed by squally shamals.

Although a Kaus heralds the approach of a winter depression, the depression may be following a course well away from the point of observation, and a gentle southeasterly wind or a Kaus may then fade away without attaining gale force or attendant bad weather.

Confusion of thought in the use of the term Kaus is similar to that of Shamal but this is less important from the practical point of view.

**Nashi.**—The local name for northeasterly winds is Nashi. During winter, over the entrance to the Persian Gulf and the Mekran coast the northeasterly is the normal wind circulating round the tongue of central Asian anti-cyclone projecting into Persia. Sometimes however with the approach of a western depression the existing anticyclonic wind circulations over Lower Persia get intensified and these freshened northeasterlies produce secondary disturbances with the on-coming southeasterlies causing cloudy weather and rain over hilly regions in the neighbourhood. It therefore happens that sometimes with the approach of a disturbance near Bushire cloudy weather with rain is also associated with northeasterly winds over Henjam-Lingeh region. These disturbances are generally of minor importance and quite localised.

**Winter Depressions.**—Some mariners express the idea that in the Persian Gulf, storms appear to cross and recross the Gulf and affect once the Persian Coast, next the Arabian Coast and again the Persian

Coast and so on. This sort of current belief about the peculiar behaviour of the depressions is due to the general impression that tropical storms with well-marked centres cause destruction over a narrow belt along the line of passage of the centre of the storm. The deep depressions of the Persian Gulf unlike tropical storms have destructive weather along the extended line described as the cold front which can extend to many hundred miles in length. It is such a well-marked squall line which passing down the Persian Gulf, gives bad weather simultaneously on the Persian and the Arabian side of the Gulf. Because the coasts are generally very thinly populated with widely scattered villages one hears of a storm now affecting Bushire on the Persian side then Bahrein on the Arabian side, again Lingeh on the Persian side, then Oman region, once again Jask on the Persian side thereby creating the impression of an oscillating storm crossing and recrossing the Gulf a number of times.

**Arabian Sea Storms.**—There is a general feeling of immunity of the region from storms of the Arabian Sea. These storms are of the concentrated type and as the inhabited places over Mekran are widely scattered between two such places the worst of the storm may pass unnoticed. With the recent organisation of meteorological services over these regions including the co-operation of the Captains of selected steamers it is hoped that more details will be available in a few years' time. In the meantime, the seaplanes that may be flying over the Oman region and follow the Muscat to Karachi route should not neglect to obtain information about the Arabian Sea storms. In an earlier chapter known storms have been briefly mentioned.

## II. SOME GENERAL LOCAL CHARACTERISTICS.

Fog in the early morning lasting for about 1 or 2 hours and increased cloudiness during summer is more frequent in the neighbourhood of Gwadar as this region is at the transitional zone between the main monsoon and deflected monsoon currents.

Dust haze is more frequent on the Arabian side of the Persian Gulf as the land winds can easily carry sand and dust from the Arabian desert.

Thunderstorms in the neighbourhood of Muscat and Lingeh-Henjam can often be observed from the station but may not occur actually at the stations. This is because of the rugged and hilly country in the immediate neighbourhood.

Strong winds, rough seas and cloudy weather are encountered more frequently over the Gulf of Oman region than over other sections. This is the usual effect produced over straits bounded on either side by land and is known to occur, for instance, over the Gulf of Mannar between India and Ceylon.

Near Gwadar western disturbances have a tendency to move along the line of mountains of the north-western frontier with changed axis and also to break up into parts. There is therefore a tendency for prolongation of disturbed weather in the neighbourhood of Gwadar.

Bumpiness appears to be greatest over the Oman region because the most frequent westerly and easterly winds over this region blow directly at right angles to the line of hills running north to south and cause

considerable vertical convection. Over the Persian Gulf away from the coasts, bumps are very infrequent.

Haze throughout the day is often caused during summer months without appreciable dust or fog along coastal districts. This is perhaps due to the presence of salt particles in the atmosphere which absorb moisture even when the humidity falls down to 70 or 80 per cent. The phenomenon is of the salt haze type and visibility under these conditions generally remains between 4 to 6 miles, the poorer visibility is generally towards the sea and in the mornings. This type of haze has also the characteristics of wet fog and a certain amount of confusion occurs in describing the two phenomena.

Muscat being on the eastern side of the hills, depressional rainfall associated with cold fronts coming from the west appears to arrive delayed by about a day. This is perhaps due to the dynamical heating of the cold air mass on its descent down the hills after crossing the Oman region and the consequent evaporation of clouds in the early stages. This situation of Muscat is also responsible perhaps for the higher average temperatures there as compared to the average over the Gulf.

The direction of land and sea breezes are dependent on the trend of the coast line. Consequently the land breeze which starts after midnight from off the land and the sea breeze from off the sea some time in the afternoon have different directions at different places.

From the pilot balloon observations over Iraq and at Bahrein it is noticed that with the approach of western depressions the southerly to easterly air currents forming the warm sector often extend up to 10,000 ft. from the ground level; occasionally however the depth of this warm air current reaches up to 3,000 feet above ground, while higher up normal northwesterly winds prevail. As the cold air mass finally replaces all the warm air, the depth of the latter current determines approximately the height up to which marked vertical convection characteristic of the interaction between discontinuous air masses can extend. Duststorms and bumpiness have been known to extend up to 10,000 feet and often the attempts of pilots to escape the effects of a depression by flying up to 10,000 feet over these regions have not resulted in any marked advantage to them.

There is so far very little information regarding temperature lapse rate in the upper air. There is however some reason to believe from the records of a few temperature measurements of the upper air at Karachi and the results of pilot balloon ascents at Gwadar and Muscat that during monsoon months there is a sharp temperature inversion layer beginning from April and lasting till October over Karachi to Oman section. The height of the inversion layer varies from 1,000 to 4,000 feet with the maximum height occurring in July and August near Karachi, these heights falling off rapidly towards Mekran. This is quite distinct from the inversion effects of the early mornings during winter months.

## 12. SUMMARY OF MONTHLY METEOROLOGICAL CONDITIONS.

The summary given below is based on all available information. The averages and extreme values of certain available meteorological data of stations like Bushire, Jask, Muscat, Pasni and Bahrein that have been in existence for different periods have been used in the summary;

consequently some of the instrumental data do not agree with those given in the tables at the end.

*January.*—On an average six western depressions affect the area and all bad weather is associated with these. Over the Persian Gulf the number of wet days varies from 8 at the head of the Gulf to 3 over the eastern section and the Arabian Coast, whereas from the Gulf of Oman to Karachi the number gradually decreases from 3 to 1; out of these, 1 or 2 occasions are associated with thunderstorm with very occasional occurrence of hail. There are 2 to 4 days when winds are squally, and are generally associated with sharp reversal of strong winds and gales characteristic of the passage of cold fronts; duststorms generally occur over Mekran on these occasions. These winds are associated with rough seas and heavy swell over the Persian Gulf and the Gulf of Oman and occasionally off Mekran.

It is the coldest month of the year when the mean minimum temperature varies from  $50^{\circ}$  to  $66^{\circ}$  and the maximum from  $63^{\circ}$  to  $78^{\circ}$ , the lowest minimum temperature recorded being  $31^{\circ}$ .

The highest monthly average rainfall of the year occurs over the eastern half of the Persian Gulf and west Mekran; over the east Mekran it is the highest winter rainfall period. Over the western section of the Persian Gulf total rainfall amount begins to decrease. The average total rainfall for the month varies from 2.89" at Bushire to 0.45" at Karachi; these figures are based on 52 years records. There is no year without rain at Bushire, the lowest number of rainy days being 3 and highest 13, whereas Jask may be rainless once in 5 years, Muscat once in 20 years, Pasni once in 10 years and Karachi in about half the number of years.

Only 20 per cent. of the days are cloudless over the Persian Gulf and 50 per cent. over Mekran. Relative humidity over the Gulf is about 80 per cent. with small diurnal variation and equally with February the relative humidity is the highest during the year. The humidity shows marked diurnal variation over Mekran and averages 60 per cent. with lowest values up to 40 per cent. towards Karachi. Visibility is generally good except during showers and duststorms whose frequency of occurrence has already been given. Average variation of air density over the whole section taking diurnal variation into consideration is between 1,175 to 1,245 gms. per cubic metre and is the highest during the year.

When there is no western depression the wind is generally calm or light in the early mornings and late in the evenings and shows well-marked land and sea breeze effect. Otherwise moderate to strong westerly to northerly and easterly to southerly winds alternate over the Gulf irrespective of the time of the day or night. It is because of this that the month is described as one with either too little or too much wind.

Up to 1,500 feet above ground, there are about 30 to 40 per cent. occasions of winds with easterly components between NE and SE and 40 per cent. occasions with westerly components between SW and NW. With increasing height the percentage occasions of easterly components decrease, till at 10,000 feet above sea level easterly components are met with on 15 per cent. occasions and strong westerly to northwesterly winds prevail.

**February.**—The general characteristics of this month are similar to those of January. In most years the lowest minimum temperature of the year is attained during this month and occasionally the total rainfall exceeds that of January although, on an average, the temperature of this month is higher and rainfall less than in January. On the other hand during this month more western depressions, on an average 8, can be traced influencing the weather and the month can be considered more windy and boisterous over the Gulf. Normally however the western depressions attain their most southerly course and begin to recede to northerly latitudes after the middle of the month.

The average total rainfall varies from 1.83" at Bushire to 0.39" at Drigh Road. About 40 to 60 per cent. of the days are cloudless throughout the whole region. Average air density varies between 1.165 to 1.235 gms. per cubic metre. The lowest recorded minimum temperature is 31°F.

**March.**—Over the Persian Gulf the weather rapidly improves to generally fine and clear but eastwards over Mekran to Karachi it begins to get dusty.

On an average 6 western depressions taking a more northerly course pass through Persia and except very occasionally the strength of squalls, intensity of rainfall and rough seas are much less marked than those of the previous month. Rainfall generally of the thunderstorm type occurs on 1 to 3 days and during intermittent years, giving the average total amount of 0.85" at Bushire and decreasing eastwards to 0.28" at Karachi. There are a few occasions when thunder and lightning at stations do not result in any rainfall. On 2 to 4 days strong squally winds prevail occasionally attaining gale force; of these 1 or 2 over the Gulf of Oman to Karachi develop into duststorm causing dusthaze for 2 to 4 days. The sea is moderate to rough during the squally periods.

Mean maximum and minimum temperatures vary from 72° to 86° and 58° to 72° respectively, the highest maximum and the lowest minimum on record being 105° and 42°. 50 to 80 per cent. days are cloudless. Humidity varies between 60 and 70 per cent. The air density varies between 1.150 and 1.225 gms. per cubic metre over the whole section.

Early mornings for an hour before and after sunrise are sometimes foggy or misty from the Gulf of Oman to Karachi but only two to four mornings with thick fog are reported. Towards the latter half of the month dust begins to be blown about by moderately strong winds during day. Consequently the visibility condition is only fair to good in general over Mekran and the Arabian side of the Persian Gulf; over the Persian side it is however good.

Land and sea breeze effect is noticeable over the Gulf but generally fades over Mekran; the predominating winds are light to moderate northerly to northwesterly over western half of the Gulf, westerly or southwesterly over Mekran coast.

The predominating upper wind at lower levels up to 1,500 feet are northerly to northwesterly over the Gulf and northwesterly to westerly over Mekran with about 20 per cent. occasions of winds with easterly components. Higher up to about 10,000 feet the prevailing winds are westerly to southwesterly over the Gulf and northwesterly to westerly over Mekran.

**April.**—The western depressions recede further north and summer conditions begin to appear, so that this is the last month of winter rains and is the beginning of the strong wind period of the summer type. About once in 3 years rainfall associated with thunderstorms occur and average rainfall varies from 0.44" at Bushire to 0.14" at Karachi. Duststorms may be expected over the whole section. A severe storm from the Arabian Sea is known to have passed over Muscat into the Gulf of Oman in 1847.

Mean maximum and minimum temperatures vary from  $81^{\circ}$  to  $91^{\circ}$  and  $67^{\circ}$  to  $79^{\circ}$ , the highest recorded maximum being  $105^{\circ}$  and the lowest minimum  $50^{\circ}$ .

The number of cloudless days vary from 50 to 90 per cent., and overcast skies are practically unknown. Humidity varies from 57 to 83 per cent. Visibility condition except in occasional years is only fair to good on account of dusthaze which generally lasts a few days even after the subsidence of the strong winds associated with duststorms. Moderate to rough seas occur over the Gulf up to Jask on 10 to 15 per cent. of the days simultaneously with squalls and duststorms on land and elsewhere the sea is generally smooth or slight. Air density varies between 1,135 and 1,190 gms. per cubic metre.

Land and sea breeze effect vanishes over east Mekran where SW to W light to moderate winds prevail; near Karachi strong wind may be expected on 8 days. Elsewhere the conditions are generally similar to March.

The upper winds over the Arabian side of the Gulf are very variable at all heights up to 10,000 feet, northerly to northwesterly being more frequent at lower levels and southerly to southwesterly at higher levels. Elsewhere over the Gulf the predominating wind is northerly to northwesterly at higher levels. Over Mekran the predominating winds are westerly to northwesterly, the easterly components in the upper winds become negligible except on about 20 per cent. occasions at higher altitudes.

**May.**—The temperature rises over the whole section and the second half of this month along with first half of the next is the hottest period of the year over east Mekran. This is also the most windy and dusty month over east Mekran. Arabian Sea storms and depressions begin to affect Mekran. Four tropical storms of the Arabian sea are so far known to have entered Mekran and Sind coasts during the last 50 years.

Mean maximum and minimum temperatures vary from  $90^{\circ}$  to  $95^{\circ}$  and  $76^{\circ}$  to  $86^{\circ}$  respectively; the highest maximum on record being  $112^{\circ}$ . The month is practically dry with possibility of occasional convectional rain of small amount once in 10 years. Over the Persian Gulf duststorms occur on 1 or 2 days and over Mekran on 2 to 6 days. Over the Gulf about 80 per cent. days are cloudless and the humidity is about 60 per cent. Over east Mekran cloudiness and humidity both increase, only 40 per cent. days being cloudless with average humidity of 70 to 80 per cent. Air density varies between 1,115 to 1,170 gms. per cubic metre. The visibility condition is decidedly the worst over Mekran and is slightly worse than that of April over the Gulf; dusthaze occurs on 2 to 5 days over the Gulf and on 6 to 10 days over east Mekran, and morning fog may also occur on 2 days.

Surface winds are moderate to strong westerly and southwesterly over east Mekran, light variable between southwesterly and southwesterly over west Mekran and Oman. Over the Persian Gulf, light winds, northwesterly to northeasterly over the Arabian side, and northwesterly to southwesterly on the Persian side, predominate with persistence of land and sea breeze effects.

The upper winds over Mekran are predominatingly westerly at lower levels and westerly to northwesterly at higher levels with about 30 per cent. easterly components occurring over the Persian coast of the Gulf of Oman. Over the Persian Gulf the prevailing upper winds are northerly to northwesterly at lower heights and westerly to northwesterly higher up, with about 20 per cent. occasions of easterly components over the Arabian side of the Gulf.

**June.**—Storms and depressions of the Arabian Sea bring in monsoon conditions over Mekran and Oman and the intense heat gets moderated towards the end of the month. 8 storms are known to have caused very rough weather during the last 50 years. The eastern depressions cause rainfall of the thunderstorm type varying from 0.74" at Karachi to 0.04" at Jask with an average of one wet day a year over east Mekran and one in 5 years westwards. The Persian Gulf remains dry.

This is the hottest month over the section from Muscat-Gwadar to Karachi. The average maximum and minimum temperatures vary from 97° to 91° and 80° to 88° respectively, the highest maximum recorded being 115°.

Rough seas and heavy southerly swell appear over east Mekran and occasionally reach the Gulf of Oman along with squalls. Over the Persian Gulf strong northwesterly winds cause duststorm on 2 to 5 days.

Cloudless days are rare over the Karachi-Gwadar section. During the first half of the month convectional clouds appear in the afternoon and during the latter half fracto-stratus scuds move eastwards. Over the Persian Gulf 70 to 90 per cent. days are cloudless. Humidity varies from 60 to 85 per cent. with only small variation between day and night. Air density varies between 1,100 to 1,150 gms. per cubic metre.

Foggy weather apparently due to salt haze occasionally occurs over the Gulf and unlike winter fogs lasts many hours; occasionally it has been known to last till the afternoon. There is also a marked deterioration of visibility over the whole section due to dust in the atmosphere. Visibility is therefore fair to poor. On 5 to 10 occasions the visibility is bad, that is below 4 on scale.

The winds are generally stronger than in May. The surface winds are westerly to southwesterly over east Mekran, southerly to easterly over west Mekran and Oman and northwesterly to northerly over the western half of the Gulf.

The upper winds at lower levels are westerly between Ormora and Karachi, westerly to southwesterly with about 30 to 40 per cent. southerly to easterly components over west Mekran and northerly to northwesterly over the Gulf; but with increasing height mostly change to northwesterly to northeasterly at 10,000 feet. Over the Arabian side of the western section of the Gulf gales in the upper air and strong surface winds are very frequent whereas on the Persian side of the eastern section of the Gulf the winds are generally light and variable.

**July.**—The monsoon winds get established over east Mekran and Oman where wind and temperatures are generally moderate. On an average about 2 eastern depressions affect the area.

Rainfall sometimes associated with thunderstorms occurs on 4 days near Karachi and falls off to 1 towards Gwadar. The average rainfall at Karachi is 2.69" but rapidly falls off westwards, till at Muscat it is only 0.02", the Persian Gulf being rainless. It is the rainiest month at Karachi where the number of wet days may be as large as 11, rainless years being very infrequent. Over the Gulf strong winds cause dust-storms on 2 to 7 days the maximum number occurring over the western half. Moderate to rough seas occur with a few quiet days over east Mekran coast but rough seas occur on only 20 per cent. occasions over the Persian Gulf.

The average maximum and minimum temperatures vary from 91° to 100° and 79° to 86° respectively; the highest recorded maximum being 112° and the lowest minimum 69°. During this month the air density attains its lowest value for the year and varies between 1,100 and 1,150 gms. per cubic metre.

Humidity varies between 80 and 90 per cent. from Pasni to Karachi and is about 70 per cent. over the rest of the section. Over the Persian Gulf and northern side of the Gulf of Oman skies are cloudless on 80 to 90 per cent. occasions; eastwards cloudiness increases and between Gwadar and Karachi clear skies seldom occur.

Misty and hazy conditions prevail over the coastal areas in the early mornings and the visibility conditions are almost similar to June. But the atmosphere begins to get clearer over the section Gwadar to Karachi where the visibility is generally fair.

The surface and upper winds are similar to those of June.

**August.**—The month is similar to July over Mekran but the weather is in general milder. Over the Persian Gulf this is the hottest month of the year with lighter winds, occasionally very humid and oppressive. Two to three eastern depressions affect the area.

Rainfall occurs on about 5 days at Karachi with an average total of 1.85", it decreases rapidly westwards till the total amount becomes negligible beyond Gwadar. Over the Gulf of Oman including Jask and Muscat rainfall may be expected once in 5 years. Dry weather prevails over the Gulf.

The mean maximum and minimum temperatures vary from 98° to 87° and 75° to 85°, the highest recorded maximum being 115°.

Humidity is about 70 to 80 per cent. The month is slightly more cloudy over Mekran than July. Rough seas are infrequent everywhere. The air density varies between 1,105 and 1,160 gms. per cubic metre.

Visibility conditions distinctly improve. Except over the Arabian side of the Gulf where some haze persists, the visibility is everywhere fair to good—only 1 to 3 days of poor visibility may occur over the Gulf.

The surface and upper winds show the same characteristics as those of July but with marked decrease of velocity. Surface winds are westerly to southwesterly over east Mekran and between southerly and easterly over west Mekran and Oman. Over the eastern half of the Gulf easterly to northeasterly and over the western half northerly to westerly winds prevail.

Upper winds at lower levels near Karachi are almost wholly westerly and over Oman and Mekran southwesterly to southeasterly but change to northerly or northeasterly at higher levels. Over the Gulf the upper winds are northerly to northwesterly at lower levels but show some 40 per cent. occasions of northeasterly to southeasterly winds at higher levels.

**September.**—Temperature begins to fall over the Persian Gulf; but shows a slight rise over the Mekran coast on account of the receding monsoon whose influence comes to an end during this month.

About two eastern depressions cause rain in the neighbourhood of Karachi and duststorms or squalls up to the Gulf during intermittent years. The average number of rainy days at Karachi is 1 to 2 and falls to *nil* at Pasni, the Persian Gulf remaining rainless. Occasionally in some years, towards the end of the month, a western disturbance moving eastwards induces a duststorm over the Gulf with dusthaze lasting for 2 to 3 days.

The average maximum and minimum temperatures vary from 88° to 94° and 71° to 82° respectively. Humidity varies from 70 to 80 per cent. throughout. The number of cloudless days increases to 40 per cent. over east Mekran and the Persian Gulf remains mostly cloudless. The dust-haze conditions are less marked but morning fog occurs on about 1 to 3 days lasting for short periods and dew also begins to fall. The visibility is good on 60 to 90 per cent. occasions. Air density varies between 1,105 and 1,177 gms. per cubic metre. The sea is generally smooth or slight over the whole section except occasionally when eastern or Arabian Sea depression give moderate to rough seas off the Mekran coast and the Gulf of Oman.

The characteristics of surface and upper winds remain the same as in August but the winds are generally lighter. The change of westerly or northwesterly at lower levels to northerly or northeasterly components at higher levels over Mekran and the extreme eastern section of the Gulf is almost complete. The western side of the Gulf shows northerly to westerly winds.

**October.**—The month is generally fine, clear and dry. The western disturbances as in the month of April begin to affect north Iraq and Persia; occasionally one or two affect this section from the Persian Gulf to the Gulf of Oman causing sharp thunderstorm type of rain about once in 5 years. Occasionally Arabian Sea depressions or eastern depressions moving north-westwards affect Mekran and the Gulf of Oman and cause duststorms and cloudy and thundery weather with some rain near Karachi. East of Jask there is no appreciable rain but thundery weather is occasionally met with.

The mean maximum and minimum temperatures vary from 88° to 94° and 65° to 75°; the highest maximum and lowest minimum recorded being 106° and 51° respectively. There are practically no overcast days and cloudless skies occur on 60 to 90 per cent. occasions. Air density varies from 1,130 to 1,190 gms. per cubic metre.

Visibility is good except towards early morning and late in the evening when a certain amount of haze towards the sea decreases the visibility to below 7 on scale. Over Mekran morning fog may occur on 6

days, elsewhere on 2 days on an average. Heavy dew also occurs during this month.

The surface winds are generally light. Land and sea breeze is well-marked over the Gulf. The upper winds are light to moderate variable. From the Gulf of Oman to Karachi below 6,000 feet westerly components are frequent, and easterly components above. Over the Persian Gulf northerly to northwesterly winds predominate.

**November.**—Temperatures are distinctly lower, the westerly winds near Karachi lose their importance and western disturbances begin to influence the weather over the extreme western half of the Gulf, otherwise the month is similar to October. The mean maximum and minimum temperatures vary from  $78^{\circ}$  to  $87^{\circ}$  and  $62^{\circ}$  to  $74^{\circ}$ ; the highest maximum and the lowest minimum recorded being  $97^{\circ}$  and  $42^{\circ}$  respectively.

About five western depressions have been traced but only two towards the end of the month may cause thunderstorms, duststorms and squalls mostly over the western half of the Persian Gulf. Besides these one or two eastern depressions or occasional Arabian Sea storms moving north-westwards are known to affect the Mekran and Oman sections causing thunderstorms, rough seas and squally weather. Over the Gulf rainfall may occur on 1 to 3 days during intermittent years with as many as 9 wet days at Bushire in certain years. The average rainfall amount varies from 1.64" at Bushire to 0.07" at Karachi.

Humidity varies from 60 to 70 per cent. Visibility is almost invariably good. Air density varies between 1,150 and 1,215 gms. per cubic metre. Fog is sometimes encountered over the Mekran coast in the morning.

The surface winds are calm or light with definite land and sea breeze effect. The upper winds are very variable and practically every direction is represented at all heights.

**December.**—About 6 western depressions influence the weather over the area, giving the highest average rainfall over the western section of the Persian Gulf. Arabian Sea depressions are unknown. On an average two thunderstorms are met with and squalls of gale force with sharp reversal of wind from SE to NW are associated with these. Seas also become rough and heavy swell appears on such occasions.

The average number of wet days is 6 at Bushire decreasing eastwards to 1 at Karachi. Average rainfall varies from 3.16" at Bushire to 0.15" at Karachi. Once in ten years Bushire may be rainless, and Karachi once in three years.

The average maximum and minimum temperatures vary from  $67^{\circ}$  to  $78^{\circ}$  and  $53^{\circ}$  to  $63^{\circ}$  respectively, the lowest recorded minimum being  $37^{\circ}$ . Cloudless days vary from 40 to 60 per cent. with about 10 per cent. overcast days. Humidity varies from 60 to 80 per cent. Visibility is good except during rain and morning fog which occasionally occurs near the head of the Persian Gulf.

Surface winds are NE over Mekran and the Gulf of Oman and north-westerly over the Persian Gulf with well-marked land and sea breeze effect.

Upper winds by about 10,000 feet are generally westerly to north-westerly but at lower heights easterly and southerly components are frequent over the whole section. On any particular day the winds may

be in opposite directions over different sections, the reversal of wind at a place will in such cases occur with a squall of the cold front type. The northwesterly squall which follows the southeasterly is generally more severe. These squalls are short lived and in these the wind force may sometimes exceed 40 m.p.h. with considerable vertical convection.

### 13. CLIMATOLOGICAL TABLES.

In tables 1 to 12 monthly mean values of various Meteorological elements together with the frequency of wind and adverse weather for all reporting stations between Bushire and Karachi have been included. It must, however, be pointed out that these mean values are only based on two to three years data that are now available after the re-organisation and extension of the observatories. The tables give a general idea of the comparative meteorological conditions likely to be met with from month to month and from place to place over the whole section.

Except those under columns 5 to 8, 33, and 51 to 56 the tables refer to 0400 and 1400 GMT observations for all stations. Two values are entered against every column; the top entries for a particular station refer to 0400 GMT observations and the bottom ones to 1400 GMT observations.

In column 2 the atmospheric pressure is given in inches of mercury at station level. If desired the values can be reduced to sea level by applying a correction of  $+0.001''$  for every one foot of elevation of the barometer above sea level; the elevations have therefore been given in column 1. Vapour tension in column 11 has the same unit as column 2.

The temperatures in columns 3 to 8 are in  $^{\circ}\text{F}$ , as obtained from thermometers 4 feet above ground exposed in Stevenson Screens.

The cloud data in columns 12 to 17 refer to clouds of all kinds taken together, whereas columns 18 to 22 show the statistics of low clouds only (stratus, cumulo-nimbus, cumulus, nimbus and strato-cumulus); amounts are given in tenths of sky covered.

The rainfall amounts in columns 23 and 25 are given in inches. The number of rainy days in column 24 represents the number of days when rainfall reported is  $0.10''$  or more.

Visibility data in columns 26 to 28 have been shown under three divisions, bad, fair and good represented by figures 0—3, 4—6 and 7—9 on the usual scale. The statistics really refer to more settled portions of the day 0400 and 1400 GMT. There is also certain amount of uncertainty in the visibility data on account of the difficulty of finding suitable landmarks at many places and difference in visibility condition towards land and sea.

The frequency of different states of sea in columns 29 to 31 are based on the reports of the observers from the coast. At most of the places shallow water which extends to long distances from the coast does not necessarily represent the state of the open sea. No systematic sea reports for Bahrein are available as the sea is not visible from the observatory. The sea remarks under Drigh Road represent the conditions at Manora, the former being 11 miles away from the sea.

Frequency of wind data are given in columns 34 to 50. The wind force is measured by Robinson cup anemometers. As the readings of

wind instruments vary with the height of the instruments above ground information regarding these heights has been included in column 32. No attempt has been made to apply correction to reduce the values to common height.

The wind directions are reported to the nearest 16 divisions of the compass. But in the tables only 8 divisions have been given by adopting the principle of throwing half the frequency of intermediate directions on either side; for example, the number of occasions of north-north-easterly winds have been put half under north and half under north-east.

The weather remarks given by the observers are however subject to great variations from one observer to another; the weather diaries are also full of similar variations. Consequently, in the preparation of the statistics of various kinds of disturbed weather it was found necessary to fix certain working limits to each kind of adverse weather phenomenon in order that statistics for different stations might be made comparable. Every individual adverse weather phenomenon reported by the observers in telegrams or noted in weather diary has received careful examination along with synoptic charts before it has been included or excluded from the statistical tables. The undermentioned specifications have in general been taken to define the different types of adverse weather indicated in columns 51 to 56. If there is a day with a squall associated with thunderstorm and duststorm, entry has been made under all the appropriate columns so that the total number of disturbed days is not necessarily the total under columns 51 to 56:—

(a) Dust storm  $\mathcal{Z}$  (Col. 51).—When visibility is 5 or less on scale, and the wind force on the surface is above 25 miles per hour, giving due regard to the exposures of anemometers.

(b) Fog  $\equiv$  (Col. 52).—When visibility is 4 or less during any period of duration of the fog.

(c) Thunderstorm  $\mathcal{K}$  (Col. 53).—Any day when even a thunder has been heard at the station with or without appreciable rain, but lightning seen at distance has not been included.

(d) Rain  $R$  (Col. 54).—A day with even the slightest evidence of any precipitation is classified under 'R'. The definition of rainy day as one when 0.10" or more rain is recorded is used for statistical purposes in the India Meteorological Department and similar information is given in column 24. But as the normal rainfall amount is very small at these places compared to Indian Stations, statistics of wet days with rainfall amounts even less than 0.10" are considered important.

(e) Squally 'SQ' (Col. 55).—Days with reported wind of force six and above on Beaufort Scale and with or without precipitation, dust storm, or reversal of winds.

(f) Dusthaze  $\infty$  (Col. 56).—When visibility on a day is 4 or less irrespective of wind force and is not due to fog.

Air density in column 9 is shown in grams per cubic metre at the times of observation 0400 and 1400 GMT. An idea of the average higher and lower limits of the air density that can be met with over the whole section from Bushire to Karachi has been given in the monthly summary. In finding out the limiting values, the atmospheric pressure and vapour tension at the average times of occurrence of maximum and minimum

air temperatures have first been roughly calculated and these data have then been used with the average maximum and minimum temperatures to give minimum and maximum air density respectively.

In tables 13 to 24 at the end the frequency of the upper winds obtained from pilot balloon observations from Bahrein, Muscat, Jask, Gwadar and Karachi (Drigh Road) have also been given. These tables are in the international form and are self-explanatory. It is however necessary to remark that the frequencies refer to good weather periods only when pilot balloon observations are possible; these frequencies are not therefore exactly comparable with the general description given under different months, in article 12, pages 19—27.

#### 14. CONCLUSION.

With the establishment of the international aerial route along the Persian Coast and the frequent use of the Basra-Bahrein-Muscat-Gwadar-Karachi route by sea planes, there is an increasing demand for a detailed knowledge of the meteorology of the section.

This meteorological summary of the region from the Persian Gulf to Karachi has therefore been prepared in the Karachi meteorological office from personal experience and study of three years daily weather charts of the region. Since the inauguration of the weather office at Karachi all possible efforts have been and are being made to collect data from all available sources. There is much yet that can be learnt and I shall be grateful if any aviator, Captain of Steamer, or local resident who reads this summary will kindly send me any meteorological data, instrumental or observational, to extend our knowledge further.

I take this opportunity to express my sincere thanks to Dr. L. A. Ramdas and Mr. P. R. K. Rao for their valuable help in the preparation of this note. My thanks are also due to Mr. Sen of the Climatological section for the preparation of the tables.

## CLIMATOLOGICAL TABLES.

TABLE I.—JANUARY.

STATION.	Bar. reduced to 32° F and Standard gravity.	AIR TEMPERATURE.—°F.					Air density gms./m <sup>3</sup> .	R. H. (Percentage).	Vapour tension.	CLOUDS.										RAIN.			VISIBILITY.					
		Max.		Wet bulb.	Min.					Percentage frequency of total cloud amount.					Percentage frequency of low cloud amount.					Total monthly (Ins.).	No. of rainy days.	Maximum in 24 hrs.	Percentage frequency.					
		Mean.	High est.		Low est.	Mean.				Mean.	Low est.	Mean.	High est.	Low est.	Mean.	High est.	Low est.	Mean.	High est.						Low est.			
																				(3)	(4)	(5)	(6)	(7)		(8)	(9)	(10)
Busbire (14)	30-09	56	53	63	74	50	44	83	388	4.6	39	8	15	20	20	3.7	3	7	21	14	8	2	0	0	100			
Bahrein (8)	30-05	61	57					75	411	4.4	38	6	16	20	20	4.0	0	10	22	16	0	3	2	0	3	97		
Lingeh (20)	30-04	64	59	67	81	57	48	85	442	5.1	26	17	15	13	29	3.3	14	12	7	18	1	0	40	3	54	43		
Henham (100)	30-03	59	56	70	83	55	41	80	408	4.8	18	32	9	19	22	2.6	17	16	9	13	0	23	1	0	21	79		
Muscat (20)	29-98	65	60					73	408	6.3	12	31	13	34	10	2.1	60	3	4	6	2	2	1	60	0	2	98	
Jask. (13)	29-99	62	58	70	83	55	41	67	442	4.4	15	33	20	17	15	2.5	54	7	3	10	2	2	1	60	0	3	97	
Charbar (26)	29-93	66	60	78	86	66	57	70	442	4.5	28	26	7	19	20	2.8	38	4	6	10	2	2	0	3	2	96	43	
Gwador (22)	30-06	63	62	78	86	66	57	71	484	4.4	11	38	10	28	6	2.1	23	23	91	8	0	3	0	88	2	68	31	
Pasni (10)	30-07	61	58	73	80	60	49	61	409	3.9	49	2	11	24	14	2.0	1	10	18	1	2	0	43	0	3	97		
Ormara (15)	30-06	62	57	73	82	59	41	72	412	3.8	46	15	3	11	25	1.0	7	5	3	24	3	2	43	0	2	98		
Drigh Road (77)	30-00	68	62					63	481	3.6	38	25	6	14	17	0.5	6	1	2	12	3	3	95	0	4	96		
	30-05	64	57	73	81	58	41	61	388	4.4	28	28	6	18	21	2.1	15	8	11	9	2	0	93	0	21	79		
	30-07	61	56	72	83	56	39	63	407	4.6	26	25	13	12	21	1.8	15	11	2	8	2	0	93	3	16	81		
	30-00	66	61					58	470	3.2	48	18	4	14	17	1.7	11	4	5	7	2	1	20	1	5	94		
	30-05	63	56	73	83	56	36	63	385	3.5	47	18	5	14	15	1.3	11	4	5	10	2	0	90	1	5	94		
	29-98	67	59					43	415	2.6	40	13	6	10	11	1.1	5	3	5	2	6	0	63	1	0	60	22	78
	29-94	57	49	77	86	52	31	55	271	3.4	39	24	10	11	16	0.9	6	8	5	0	3	0	16	2	29	69		
	29-93	67	56					47	319	2.0	44	10	18	11	8	0.5	13	0	0	0	3	0	16	2	10	06		

## CLIMATOLOGICAL TABLES.

TABLE I—JANUARY—concluded.

STATION.	STATE OF SEA.			PERCENTAGE FREQUENCY OF WINDS.																WEATHER REMARKS.						
	Percentage frequency.			Velocity 4-15 M. P. H.												Velocity 16-31 M. P. H.				Number of occasions of						
	Sm	Mod	Ro	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW							
	(29)	(30)	(31)	(34)	(35)	(36)	(37)	(38)	(39)	(40)	(41)	(42)	(43)	(44)	(45)	(46)	(47)	(48)	(49)	(50)						
				Mean average wind velocity M. P. H.	Vel. loss than																					
				(32)	(33)																(51)	(52)	(53)	(54)	(55)	(56)
Bushire (14)	99	1	0	49	6.6	20	10	10	5	1	1	4	1	1	1	1	1	1	1	47	1	1	1	8	3	..
Bahrain (8)	93	4	3	36	6.4	12	4	3	11	5	33	2	2	2	1	1	1	1	7	17	1	1	3	2	..	
Lingeh (20)	—	—	—	23	5.6	9	2	7	7	2	18	16	1	1	1	1	1	1	4	42	1	3	1	3	2	..
Henjam (100)	74	10	16	41	7.8	24	2	7	2	..	4	26	3	1	1	1	1	1	1	39	1	..	1	5	1	1
Muscat (20)	86	4	10	40	4.0	7	17	12	2	..	5	17	1	1	1	1	1	1	..	24	1	1	1	4	2	1
Jask (12)	88	10	2	35	7.2	18	38	2	..	22	6	2	2	5	1	1	1	1	..	35	1	1	1	4	2	1
Charbar (25)	97	1	2	40	5.7	4	24	9	12	3	2	5	7	1	1	1	1	1	73	47	..	..	2	5	4	..
Gwador (2-)	91	7	2	5	5.1	1	25	9	10	2	2	4	4	1	1	1	1	1	..	31	1	1	2	4	3	1
Pasni (10)	96	4	0	20	6.3	24	1	7	12	10	19	21	..	1	1	1	1	1	44	42	1	1	1	3	..	1
Ormara (15)	99	1	0	7	3.9	3	18	21	1	11	6	6	7	3	1	1	1	1	..	44	..	..	..	3	1	2
Drigh Road (77)	97	3	0	24	6.3	17	11	4	1	1	12	7	2	1	1	1	1	1	46	44	..	..	..	3	1	2
	97	3	0	24	6.3	20	12	9	3	14	15	2	3	1	1	1	1	1	33	34	1	1	1	3	..	1
	99	1	0	7	3.9	2	8	10	2	2	5	3	2	1	1	1	1	1	..	68	..	2	..	3	2	2
	98	2	0	7	3.9	2	8	10	2	2	8	15	23	6	..	..	..	..	..	43	..	2	..	3	2	2
	97	3	0	24	6.3	23	19	2	2	..	15	27	10	2	..	2	..	..	..	40	1	1	1	2	2	2

☁ = Duststorm; ☾ = Fog; ☼ = Thunderstorm; ☼ = Rain; Sq = Squall; ∞ = Dusthaze.

## CLIMATOLOGICAL TABLES.

TABLE II.—February.

STATION.	(1)	Bar. 32° and standard gravity. (2)	AIR TEMPERATURE.—° F.						Air density grms./ft. <sup>3</sup> . (9)	R. H. (Percentage). (10)	Vapour tension. (11)	CLOUDS.						RAIN.				Percentage frequency. (28)	VISIBILITY.				
			Wet bulb.			Dry bulb.						Total monthly (ins.). (24)	No. of rainy days. (25)	Maximum in 24 hrs. (26)	Percentage frequency of total cloud amount.			Percentage frequency of low cloud amount.									
			Max. (3)	Mean. (4)	Min. (5)	Lowest. (6)	Mean. (7)	Highest. (8)							Mean amount. (12)	No. cloud. (13)	1-3 (14)	4-6 (15)	7-9 (16)	10 (17)	Mean amount of low cloud (18)			1-3 (19)	4-6 (20)	7-9 (21)	10 (22)
Bushire (14)	.	30-02 29-08	59 65	68 84	54 45	1225 1207	81 76	402 468	81 76	402 468	54 46	1 25	12 12	15 16	2-6 2-7	0 5	8 14	10 11	3	2-27	0 0	9 1	92 90				
Bahrain (8)	.	30-01 29-07	61 67	71 89	59 45	1217 1203	83 75	459 485	83 75	459 485	41 37	14 16	9 13	15 14	2-5 2-0	5 5	9 8	13 11	1	0-23	2 0	52 13	46 82				
Lingeh (20)	.	29-08 29-02	61 69	73 87	57 46	1215 1195	84 74	468 525	84 74	468 525	40 37	25 21	14 19	2 9	1-1 1-7	35 43	5 7	2 0	6	2-34	0 0	2 3	98 97				
Kenjam (100)	.	29-03 29-08	64 69	73 85	60 49	1207 1195	83 71	507 509	83 71	507 509	42 40	33 32	9 8	9 15	1-3 1-6	28 35	7 7	1 3	5	1-20	0 0	14 15	86 85				
Muscat (20)	.	29-09 29-03	68 73	78 90	67 53	1199 1185	74 66	514 544	74 66	514 544	38 42	27 16	14 23	5 2	1-1 0-8	14 9	12 12	3 0	0	1-62	0 0	53 47	47 47				
Jask (15)	.	30-01 29-05	66 71	85 85	63 52	1206 1190	71 67	467 525	71 67	467 525	69 67	2 8	12 9	13 11	1-2 1-3	1 1	7 8	11 1	1	1-39	0 0	5 9	95 91				
Charbar (25)	.	30-01 29-05	65 71	86 86	61 45	1208 1190	76 66	447 590	76 66	447 590	63 53	9 19	7 12	18 14	1-2 1-3	7 11	8 7	6 1	1	0-66	1 0	15 16	84 85				
Gwador (22)	.	30-01 29-04	67 63	72 77	61 41	1203 1191	69 62	491 485	69 62	491 485	28 29	14 26	3 11	3 15	2-3 1-2	23 18	8 6	5 3	5	0-70	3 0	82 81	85 89				
Pasni (10)	.	30-02 29-05	65 69	77 93	58 43	1209 1194	70 73	445 540	70 73	445 540	53 68	14 9	6 8	21 9	0-9 0-4	6 11	7 1	2 0	3	0-07	0 0	5 9	95 91				
Ormara (15)	.	30-02 29-04	67 71	89 89	43 59	1205 1193	71 63	487 472	71 63	487 472	47 43	15 15	11 22	9 7	1-0 0-7	15 15	11 3	2 2	0	0-03	2 0	11 9	87 91				
Digh Road (77)	.	29-06 29-09	60 71	82 93	54 35	1219 1189	69 53	342 427	69 53	342 427	42 39	20 17	5 15	18 13	0-6 0-5	2 2	5 5	2 0	2	0-10	2 0	29 7	69 93				

Figures in brackets under the stations indicate height of barometer cistern above sea-level in feet.

## CLIMATOLOGICAL TABLES.

TABLE II.—February—concluded.

STATION.	STATE OF SEA.			Mean average wind velocity M. P. H. (33)	PERCENTAGE FREQUENCY OF WINDS.																WEATHER REMARKS.					
	Percentage frequency.				Velocity 4-15 M. P. H.								Velocity 16-31 M. P. H.								Number of occasions of					
	Ht. of anemometer, ft. above ground.				Velocity 4-15 M. P. H.								Velocity 16-31 M. P. H.													
	Sm (29)	Mod (30)	Ro (31)		N (34)	NE (35)	E (36)	SE (37)	S (38)	SW (39)	W (40)	NW (41)	N (42)	NE (43)	E (44)	SE (45)	S (46)	SW (47)	W (48)	NW (49)	Vel. less than M. P. (50)	☁	☉	K	B	Sq
Bushire (14)	96	1	3	49	7-0	13	6	13	8	3	5	7	2	2	3	6	..	..	12	30	..	1	1	7	4	..
Bahrain (8)	92	3	5	36	5-5	14	1	5	22	3	2	5	13	3	1	..	..	1	28	23	1	1	3	6	4	2
Lingeh (20)	—	—	—	23	7-8	6	14	13	1	2	23	6	9	2	..	..	..	..	48	39	1	1	3	5	2	1
Henjam (100)	86	7	7	41	7-2	7	21	2	..	8	3	3	3	2	1	..	2	..	56	47	2	1	2	4	1	2
Muscat (20)	94	1	5	40	4-0	7	6	21	11	..	..	8	9	..	..	1	..	..	76	39	1	1	..	4	1	1
Jask (13)	81	14	5	35	8-5	7	14	14	1	2	5	3	9	1	6	2	..	1	41	22	1	..	..	3	4	2
Charbar (25)	66	25	9	24	5-0	3	6	20	1	1	..	1	9	2	1	..	..	..	54	35	..	..	..	3	1	2
Gwador (22)	97	1	2	40	4-6	7	11	7	1	1	8	21	9	3	1	..	..	1	51	27	1	1	1	2	1	2
Faani (10)	91	7	2	5	5-7	2	2	1	9	11	20	16	5	..	1	..	5	1	48	13	1	1	..	2	1	1
Ormora (15)	100	0	0	20	5-2	7	7	8	1	..	13	18	2	..	1	..	..	1	60	24	..	1	1	3	2	1
Drigh Road (77)	100	0	0	7	5-2	3	1	3	3	9	24	29	1	..	..	1	3	1	24	61	2	3	..	..	2	2

☁ = Dust storm    ☁☁ = Fog    ☁☁☁ = Thunderstorm    R = Rain    Sq = Squall    ∞ = Dust haze.

## CLIMATOLOGICAL TABLES.

TABLE III.—March.

STATION.	Bar. reduced to 32° F. and gravity.	AIR TEMPERATURE—°F.						Air density gms./in. <sup>3</sup>	R. H. (Percentage).	Vapour tension.	CLOUDS.										RAIN.					VISIBILITY.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
		Max.		Min.		Wet bulb.	Dry bulb.				Percentage frequency of total cloud amount.					Mean amount of low cloud.	Percentage frequency of low cloud amount.				Total monthly (in.).	No. of rainy days.	Maximum in 24 hrs.	Percentage frequency.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
		Mean.	Highest.	Mean.	Lowest.						No. of cloud.	1-3	4-6	7-9	10		1-3	4-6	7-9	10																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
																									(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
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Figures in brackets under the stations indicate height of barometer cistern above sea-level in feet.

## CLIMATOLOGICAL TABLES.

TABLE III—March—concluded.

STATION.	PERCENTAGE FREQUENCY OF WINDS.										WEATHER REMARKS.																				
	STATE OF SEA.		Percentage frequency.		Ht. of anemometer, ft. above ground.	Mean average wind velocity M. P. H.	Velocity 4-15 M. P. H.										Velocity 16-31 M. P. H.														
							Velocity 4-15 M. P. H.										Velocity 16-31 M. P. H.														
	Sm	Mod	Ro	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	Number of occasions of	☐	☐	☐
(29)	(30)	(31)	(32)	(33)	(34)	(35)	(36)	(37)	(38)	(39)	(40)	(41)	(42)	(43)	(44)	(45)	(46)	(47)	(48)	(49)	(50)	(51)	(52)	(53)	(54)	(55)	(56)	☐	☐	☐	☐
Bushire (14)	94	3	3	49	7-9	21	2	3	3	2	..	13	11	2	..	..	2	..	..	2	55	1	1	2	2	2	2	2	..	..	..
Bahrain (8)	81	13	6	38	5-2	19	5	3	8	6	2	2	18	..	..	..	..	..	..	2	42	1	2	3	3	1	1	1	..	..	..
Lingeh (20)	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Henjam (100)	95	5	0	23	5-6	10	23	5	5	..	8	10	19	..	..	..	..	..	..	2	42	..	..	1	2	2	..	..	..	..	..
Muscate (20)	79	16	5	41	7-1	16	13	2	..	11	13	2	21	..	..	..	..	..	..	..	45	1	1	2	2	1	1	1	..	..	..
Jask (13)	87	2	11	40	4-3	..	2	23	3	..	..	6	26	..	..	..	..	..	..	..	66	1	..	..	2	1	1	1	..	..	..
Charbar (25)	92	6	2	35	7-9	5	6	11	5	8	13	2	21	..	..	2	..	..	..	3	50	1	..	1	4	2	2	2	..	..	..
Gwador (22)	87	10	3	40	5-2	3	2	11	2	15	35	18	31	..	..	..	..	..	..	5	45	1	..	1	1	1	1	1	1	1	1
Panl (10)	97	0	3	5	5-8	..	..	5	6	2	8	8	2	..	..	..	..	..	..	..	40	1	2	..	..	1	1	1	1	1	1
Ormora (15)	97	3	5	20	6-1	13	5	5	2	2	8	15	32	..	..	..	..	..	..	..	40	2	3	1	1	3	3	3	3	3	3
Drigh Road (77)	100	0	0	20	7-1	2	2	2	2	2	3	4	50	..	..	..	..	..	..	..	27	2	1	..	1	2	2	2	2	2	2
	100	0	0	7	7-6	8	8	2	2	..	29	10	6	..	..	..	..	..	..	..	3	3	..	..	1	3	4	4	4	4	4

☐ = Duststorm; ☐ = Fog; ☐ = Thunderstorm; ☐ = Rain; ☐ = Squall; ☐ = Dusthaze.

## CLIMATOLOGICAL TABLES.

**TABLE IV.—April.**

TABLE IV.—April.																												
STATION	Bar. reduced to 32° F. and Standard	AIR TEMPERATURE —°F.						Air density gms./m <sup>3</sup>	F. H. (Percentage).	Vapour tension.	CLOUDS.								RAIN.				VISIBILITY.					
		Dry bulb.		Wet bulb.		Max.					Min.		Percentage frequency of total cloud amount.				Percentage frequency of low cloud amount.				Total monthly (ins.). (23)	No. of rainy days. (24)	Maximum in 24 hrs. (25)	Percentage frequency.				
		(3)	(4)	(5)	(6)	(7)	(8)				No cloud. (13)	Percentage frequency of low cloud amount.			Mean amount. (12)	No cloud. (13)	Percentage frequency of low cloud amount.			Mean amount. (18)					Percentage frequency of low cloud amount. (19)	4-6 (20)	7-9 (21)	10 (22)
												1-3 (14)	4-6 (15)	7-9 (16)			10 (17)	1-3 (19)	4-6 (20)									
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	
Bushire (14)	29-82	75	67	82	100	70	60	1176	64	-551	2-1	64	3	23	7	3	1-2	0	10	7	2	5	..	..	0	0	100	
Bahrain (8)	29-78	79	70	89	105	70	58	1166	64	-597	2-3	62	10	8	15	5	1-7	0	3	12	5	..	..	-18	..	0	42	58
Bahrein (8)	29-83	76	69	80	105	70	58	1174	65	-598	1-7	52	20	8	12	8	0-7	3	0	2	13	..	..	..	0	25	75	
Lingeh (20)	29-76	79	73	90	104	69	60	1163	74	-728	2-9	33	28	15	12	2	0-8	27	8	0	0	..	..	-08	..	0	8	92
Yenjam (100)	29-74	78	74	88	99	72	60	1164	83	-786	1-8	42	43	7	10	5	1-2	38	3	2	5	..	..	..	..	0	20	80
Muscat (20)	29-75	86	77	90	103	81	74	1146	68	-793	1-7	54	25	18	3	0	0-4	12	2	0	0	..	..	-12	..	3	10	81
Jask (13)	29-77	78	71	87	96	73	67	1166	71	-883	0-3	95	2	0	5	0	0-2	5	2	0	0	..	..	..	..	7	18	75
Charbar (25)	29-72	83	74	87	94	73	67	1152	81	-716	1-1	80	5	10	5	0	0	0	0	0	0	..	..	-30	..	0	20	80
Giwar (22)	29-73	82	78	91	104	74	63	1158	73	-739	1-5	55	32	8	5	0	0-5	20	2	2	0	..	..	..	..	0	33	67
Pasni (10)	29-79	81	75	91	105	71	62	1158	73	-776	1-7	63	22	0	8	7	0-6	8	2	2	2	..	..	..	..	3	84	13
Ormara (15)	29-81	81	74	90	105	71	62	1159	71	-757	1-3	71	13	8	3	5	0-3	7	0	3	0	..	..	..	..	0	12	88
Drign Road (77)	29-75	83	76	95	104	73	62	1158	79	-793	1-1	68	20	7	3	2	0-2	8	2	0	0	..	..	..	..	0	7	93
	29-79	81	75	91	103	75	64	1158	75	-803	1-7	44	33	20	3	0	1-2	27	5	2	0	..	..	..	..	0	2	98
	29-70	83	75	91	103	75	64	1154	67	-741	1-6	48	37	12	3	0	0-7	27	5	2	0	..	..	..	..	0	7	93
	29-75	81	74	95	104	73	62	1157	69	-715	3-1	52	14	7	15	14	1-5	14	5	12	0	..	..	..	..	0	33	67
	29-67	83	76	95	104	73	62	1150	69	-740	3-0	43	18	17	8	14	0-9	17	8	2	0	..	..	..	..	0	32	68

Figures in brackets under the stations indicate height of barometer cistern above sea-level in feet.

## CLIMATOLOGICAL TABLES.

**TABLE IV.—April—concluded.**

STATION.	STATE OF SEA.		Ht. of anemometer, ft. above ground.	Mean average wind velocity M. P. H.	PERCENTAGE FREQUENCY OF WINDS.												Vol. less than 4 M. P. H.	WEATHER REMARKS.									
	Percentage frequency.				Velocity 4-15 M. P. H.						Velocity 16-31 M. P. H.							Number of occasions of									
	S m	Ro			N	NE	E	SE	S	SW	W	NW	N	NE	E	SE		S	SW	W	NW	☐	☐	K	B	Sq.	∞
	(29)	(30)			(31)	(34)	(35)	(36)	(37)	(38)	(39)	(40)	(41)	(42)	(43)	(44)		(45)	(46)	(47)	(48)	(49)	(50)	(51)	(52)	(53)	(54)
Bushire (14)	92	3	5	49	6-8	13	10	7	2	3	10	19	27	9	3	2	12	3	5	43	2	..	1	..	4	3	
Bahrein (8)	86	4	10	36	4-4	27	3	2	2	2	3	10	20	..	..	..	..	..	52	1	..	1	1	2	3		
Lingeh (20)	85	7	8	23	5-7	3	10	32	13	..	5	33	36	..	2	5	7	..	27	2	..	..	1	3	3		
Henham (100)	97	3	0	41	7-9	5	3	..	..	..	5	33	32	..	2	15	3	..	58	2	..	..	..	2	4		
Muscat (20)	91	7	2	40	4-2	3	1	17	14	..	..	..	2	32	..	2	..	..	65	1	..	..	1	1	2		
Jask (13)	92	1	7	35	7-8	5	..	20	3	..	..	8	23	..	3	..	..	2	32	1	4	..	..	2	1		
Charbar (25)	98	0	2	40	4-7	3	2	10	7	3	..	5	13	..	..	5	13	..	56	1	..	1	1	1	2		
Gwador (22)	98	2	0	5	5-4	..	3	10	..	2	8	30	5	..	..	8	12	..	42	..	1	..	..	1	3		
Pasni (10)	98	2	0	20	7-2	5	..	2	3	10	53	18	..	..	..	..	..	..	13	1	..	..	..	2	2		
Ormara (15)	100	0	0	7	9-6	2	2	3	3	3	34	47	2	..	..	3	4	1	..	..	2	2	..	4	3		
Drigh Road (77)	93	6	1	24	9-7	3	5	..	2	..	..	10	40	7	..	3	12	1	17	3	1	..	..	8	4		

## TABLE V—May.

Figures in brackets under the stations indicate height of barometer cistern above sea-level in feet.

Figures in brackets under the stations indicate height of barometer cistern above sea-level in feet.

## CLIMATOLOGICAL TABLES.

TABLE V—May—concluded.

STATION.	STATE OF SEA.			PERCENTAGE FREQUENCY OF WINDS.																WEATHER REMARKS.									
	Percentage frequency.			Velocity 4-15 M. P. H.				Velocity 16-31 M. P. H.												Number of occasions of									
	Sm	Mod	Ro	Mean average wind velocity M. P. H.				N				N				N				N				☐	≡	K	R	Sq	∞
				Ht. of anemometer, ft. above ground.	(32)	(33)	(34)	(35)	(36)	(37)	(38)	(39)	(40)	(41)	(42)	(43)	(44)	(45)	(46)	(47)	(48)	(49)	(50)						
	(29)	(30)	(31)																										
Bushire (14)	100	0	0	49	10	2	8	3	1	11	17	31	18	..	..	..	..	..	..	2	58	1	..	..	..	3	2		
Bahrain (8)	99	1	0	29	1	..	..	8	3	13	16	15	13	..	..	..	..	..	..	10	47	1	..	..	..	4	5		
Langkah (20)	—	—	—	26	3	26	10	..	2	2	..	19	..	..	2	..	..	..	..	..	15	..	..	..	..	..	..		
Henjam (100)	95	3	2	23	8	6	35	11	..	6	42	39	8	..	..	..	..	..	..	..	34	2	2	..	..	8	4		
Muscat (20)	67	13	20	41	..	..	..	..	..	15	11	6	..	..	..	..	..	..	..	..	60	2	2	..	1	2	4		
Jaak (13)	95	5	0	40	3	5	..	..	..	2	35	27	16	..	..	..	..	..	..	..	73	..	1	..	..	2	2		
Charbar (25)	82	17	1	85	..	..	15	5	..	..	5	17	..	..	..	..	..	..	..	..	61	..	3	..	..	2	2		
Gwador (22)	98	0	2	2	3	2	24	3	7	24	31	17	..	..	..	..	..	..	..	2	27	1	3	..	..	3	4		
Pasni (10)	57	26	17	24	2	10	11	2	6	15	27	16	8	..	..	2	..	..	..	..	43	1	1	..	..	2	3		
Ormara (15)	98	2	0	40	..	..	..	..	..	2	5	24	..	..	..	..	..	..	..	..	26	3	1	..	..	3	8		
Drigh Road (77)	92	8	0	5	..	..	..	..	..	11	55	2	..	..	..	..	..	..	..	..	18	3	1	..	..	8	8		
	100	0	0	20	..	..	..	..	..	18	45	16	..	..	..	..	..	..	..	..	6	3	2	..	..	5	6		
	100	0	0	7	..	..	..	..	..	6	42	29	2	..	2	..	..	..	..	..	5	3	2	..	..	5	6		
	100	0	0	2	..	..	..	..	..	3	6	40	43	2	..	..	..	..	..	..	..	4	1	..	..	8	8		
	100	0	0	24	..	..	..	..	..	..	23	56	..	..	..	..	..	..	..	..	10	2	..	..	..	8	7		
	78	22	0	2	..	..	..	..	..	..	29	37	2	..	..	..	..	..	..	..	3	27	..	..	..	6	7		
	61	34	2	2	..	..	..	..	..	..	37	39	3	..	..	..	..	..	..	..	10	3	..	..	..	6	7		

☐ = Duststorm; ≡ = Fog; K = Thunderstorm; R = Rain; Sq. = Squall; ∞ = Dusthaze.

☐ = Duststorm; ≡ = Fog; K = Thunderstorm; R = Rain; Sq = Squall; ∞ = Dusthaze.

## CLIMATOLOGICAL TABLES.

TABLE VI—JUNE.

STATION.	Bar. reduced to 32° F and Standard Gravity.	AIR TEMPERATURE—°F.							Air density gms./m <sup>3</sup> .	R. H. (Percentage).	Vapour tension.	CLOUDS.										RAIN.			VISIBILITY.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
		Max.		Min.	Wet bulb.		Dry bulb.	Mean total amount.				Percentage frequency of total cloud amount.					Mean amount of low cloud.	Percentage frequency of low cloud amount.					Total monthly (ins.).	No. of rainy days.	Maximum in 24 hrs.	Percentage frequency.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
		Highest.	Mean.		(3)	(4)						(5)	(6)	Lowest.	(7)	(8)		(9)	(10)	(11)	(12)	(13)						1-3	4-6	7-9	10	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											

Figures in brackets under the stations indicate height of barometer column above sea-level in feet.

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WEATHER REMARKS.

Duststorm;  $\text{K} = \text{Thunderstorm}$ ;  $\text{R} = \text{Rain}$ ;  $\text{Sq.} = \text{Squall}$ ;  $\infty = \text{Dusthaze}$ .

## CLIMATOLOGICAL TABLES.

TABLE VII.—July.

STATION.	Bar. reduced to 32° F. and standard gravity.	AIR TEMPERATURE.—°F.						Air density grms./m <sup>3</sup> .	R. H. (Percentage).	Vapour tension.	CLOUDS.										RAIN.		VISIBILITY.				
		Max.			Min.						Percentage frequency of total cloud amount.				Mean amount.	Percentage frequency of low cloud.				No. of rainy days.	Total monthly (ins.).	Maximum in 24 hrs.	Percentage frequency.				
		Wet bulb.	Dry bulb.	Mean.	Highest.	Mean.	Lowest.				N. cloud.	1-3 (13)	4-6 (14)	7-9 (15)		10 (16)	Mean amount of low cloud.	1-3 (17)	4-6 (18)					7-9 (19)	10 (20)		
																										(3)	(4)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)
Bushire (14)	29-43 29-39	89 93	82 85	95 102	87 77	77	1124 1114	73 72	1-004 1-103	0-7 0-4	86 91	6 4	4 5	2 0	2 0	0-3 0	0 0	0 0	0 0	2 0	1 0				9 3	36 26	55 71
Bahrain (8)	26-46 26-41	90 96	81 84	100 110	84 75	75	1126 1107	68 61	-972 -1-237	0-7 0-1	85 95	5 0	2 0	0 0	0 0	0-2 0	3 0	2 0	0 0	0 0				15 2	69 69	16 29	
Lingsh (20)	29-40 29-32	91 97	85 85	99 109	84 76	76	1118 1104	77 63	-1-142 -1-025	1-8 0-5	61 85	19 10	5 2	15 0	0 0	1-1 0-2	6 5	11 2	5 0	0 0				0 0	26 19	74 81	
Henham (100)	29-36 29-27	90 92	86 84	99 107	82 81	81	1119 1111	79 72	-1-111 -1-074	0-9 0-3	74 72	3 18	5 5	2 0	0 0	0-8 0-6	13 16	2 5	2 0	5 3				0 0	56 53	44 47	
Muscat (20)	29-44 29-38	89 90	81 83	96 110	86 78	78	1126 1120	76 76	-987 -1-036	2-9 3-2	48 46	18 17	8 18	2 4	2 4	1-7 1-1	9 5	13 10	12 6	0 0				3 3	84 87	13 10	
Jask (13)	29-43 29-36	88 92	82 84	97 104	86 80	80	1126 1111	74 69	-986 -1-044	1-3 0-6	85 91	0 0	1 4	10 3	2 0	0-4 0	1 0	5 0	0 0	0 0				0 0	83 89	17 11	
Charhar (25)	29-47 29-39	88 87	81 83	92 112	82 77	77	1129 1127	76 79	-993 -1-060	3-1 3-3	44 42	15 16	21 14	19 26	2 2	2-1 2-5	13 14	13 8	21 21	2 2				0 0	97 97	8 3	
Gwador (22)	29-47 29-38	84 86	79 80	91 106	80 75	75	1133 1131	77 75	-907 -911	6-3 6-3	11 10	19 24	13 10	23 18	34 38	5-5 4-4	21 24	13 11	18 21	31 18				3 10	97 90	0 0	
Pasni (10)	29-48 29-41	84 85	80 81	91 98	79 76	76	1137 1133	80 82	-951 -981	6-0 4-3	17 27	16 25	12 19	13 17	37 17	2-8 2-2	18 16	12 13	4 2	6 6				3 0	47 29	50 71	
Ormara (15)	29-48 29-41	85 84	81 81	91 96	82 77	77	1136 1134	83 84	-990 -993	5-7 4-7	18 13	21 32	13 24	11 19	35 19	4-2 2-7	31 22	10 8	11 18	21 8				0 0	85 81	15 19	
Drigh Road (77)	29-41 29-37	85 82	79 77	91 99	82 72	72	1132 1130	79 79	-943 -924	9-1 8-3	3 3	2 6	3 22	13 13	75 68	7-6 6-1	8 8	16 39	21 19	48 24				0 0	90 77	10 23	

Figures in brackets under the stations indicate height of barometer cistern above sea-level in feet.

## CLIMATOLOGICAL TABLES.

TABLE VII.—July—concluded.

STATION.	STATE OF SEA.		PERCENTAGE FREQUENCY OF WINDS.											WEATHER REMARKS.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
	Percentage frequency.	Ht. of anemometer above ground.	Velocity 4-15 M. P. H.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
			Velocity 16-31 M. P. H.											Number of occasions of																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
			Sm	Mod	Ro	N	NE	E	SE	S	SW	W	NW		N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE

☼ = Duststorm; ☼ = Fog; K = Thunderstorm; R = Rain; Sq = Squall; ∞ = Dusthaze.

## CLIMATOLOGICAL TABLES.

TABLE VIII.—August.

STATION.	Bar. reduced to 32° F. and standard gravity.	AIR TEMPERATURE—°F.							Air density gms./m <sup>3</sup> .	R. H. (Percentage).	Vapour tension.	CLOUDS.						RAIN.			VISIBILITY.							
		Dry bulb.			Wet bulb.		M in.					Percentage frequency of total cloud amount.						Total monthly (ins.).	No. of rainy days.	Maximum in 24 hrs.	Percentage frequency.							
		(3)	(4)	(5)	(6)	(7)	(8)	Percentage frequency of low cloud amount.																				
								(10)				(11)	(12)	(13)	(14)	(15)	(16)				(17)	(18)	(19)	(20)	(21)	(22)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	
Bushire (14)	29-51 29-47	89 88	83 86	96 102	85 78	85	78	1129 1115	76 74	1-020 1-159	0-4 0-2	90 97	4 2	2 1	4 0	0 0	0-3 0	2 0	0 0	0 0	0 0	3 0	..	..	..	1 0	24 13	75 87
Bahrain (8)	29-53 29-46	89 86	81 82	101 111	82 75	82	75	1130 1115	69 63	0-943 0-888	0-9 0-6	76 85	16 6	3 3	2 0	3 0	0-1 0	2 0	0 0	0 0	0 0	0 0	..	..	..	2 0	87 71	1 49
Lingeh (20)	29-48 29-41	91 95	85 86	98 106	85 77	85	77	1121 1110	78 64	1-122 1-059	2-3 1-1	46 70	24 19	17 6	11 4	2 1	1-3 0-6	25 24	7 2	4 2	1 1	2 1	..	..	..	0 0	30 20	70 80
Henjam (100)	29-45 29-37	90 92	85 85	97 105	85 82	85	82	1120 1114	81 73	1-131 1-104	1-7 1-3	52 61	22 25	12 8	8 4	6 1	1-5 1-2	21 21	3 3	4 1	5 0	..	..	..	..	2 1	52 39	46 60
Muscat (20)	29-55 29-49	84 86	80 81	91 105	82 75	82	75	1140 1134	82 81	0-959 0-987	3-0 2-5	36 36	31 31	15 27	15 5	3 1	0-6 0-8	20 21	6 8	4 0	0 0	0 0	..	..	..	3 9	73 71	25 20
Jask. (13)	29-55 29-48	86 89	84 81	93 101	83 79	83	79	1135 1126	76 72	0-957 0-989	2-9 0-5	56 90	3 4	14 2	27 0	0 1	1-6 0	4 0	6 1	14 0	0 0	0 0	..	..	..	0 0	82 75	18 25
Charhar (25)	29-61 29-53	83 83	79 78	87 102	79 75	79	75	1145 1143	80 86	0-905 0-948	5-7 3-0	13 39	16 25	21 15	45 0	5 0	5-0 2-5	16 33	15 21	42 12	5 0	..	..	..	2 0	75 77	23 23	
Gwador (22)	29-59 29-50	81 82	75 75	87 101	77 71	77	71	1151 1146	75 73	0-777 0-791	8-0 6-5	10 10	7 15	2 14	17 36	64 25	8-0 5-8	7 13	5 24	16 19	64 13	..	..	..	2 3	98 97	0 0	
Pasni (10)	29-59 29-53	81 81	77 77	88 105	77 71	77	71	1147 1147	78 81	0-827 0-861	6-5 3-2	15 37	11 29	8 11	8 15	6 15	4-3 2-7	13 29	19 13	13 6	21 3	..	..	..	3 0	8 8	89 97	
Ormara (15)	29-60 29-53	81 81	78 77	87 101	79 75	79	75	1149 1147	83 84	0-867 0-887	7-3 4-2	5 16	11 32	6 25	48 16	30 11	6-1 2-8	8 31	11 17	43 12	21 3	..	..	..	0 0	39 40	61 60	
Drigh Road (77)	29-52 29-48	81 81	76 76	87 90	78 72	78	72	1147 1145	77 76	0-823 0-836	9-5 8-2	.. 2	2 8	2 16	16 19	80 54	8-7 7-4	3 1	11 27	16 18	67 37	0-70	1	1-91	0 0	62 59	37 40	

Figures in brackets under the stations indicate height of barometer cistern above sea-level in feet.

## CLIMATOLOGICAL TABLES.

TABLE VIII—August—concluded.

STATION.	STATE OF SEA.			Ht. of anemometer, ft. above ground.	Mean average wind velocity M. P. H.	PERCENTAGE FREQUENCY OF WINDS.																WEATHER REMARKS.															
	Percentage frequency.					Velocity 4-15 M. P. H.								Velocity 16-31 M. P. H.								Number of occasions of															
	Sm	Mod	Ro			N				E				S				W								N				E				S			
						(29)	(30)	(31)	(34)	(35)	(36)	(37)	(38)	(39)	(40)	(41)	(42)	(43)	(44)	(45)	(46)	(47)	(48)	(49)	(50)	(51)	(52)	(53)	(54)	(55)	(56)	ψ	≡	K	R	Sq	
Bushire (14)	100	0	0	49	9	..	5	..	1	1	2	7	1	..	..	..	..	..	..	73	1	..	..	..	2	3	..	..	..	..	..						
Bahrein (8)	100	0	0	36	18	6	18	..	..	8	13	9	2	..	..	..	..	..	..	14	2	1	..	..	4	3	..	..	..	..	..						
Lingsh (26)	51	28	21	23	..	17	42	7	..	..	19	1	..	6	3	..	..	..	..	22	1	1	..	..	1	1	..	..	..	..	..						
Henjam (100)	97	8	0	41	2	38	14	4	..	13	6	1	..	1	..	..	..	..	..	40	1	1	..	..	1	1	..	..	..	..	..						
Muscat (20)	96	4	0	40	..	4	20	3	..	..	..	4	..	..	..	..	..	..	..	68	..	..	..	..	1	2	..	..	..	..	..						
Jask (13)	64	31	5	35	..	1	47	14	..	..	2	2	..	..	19	1	..	..	1	14	1	..	..	1	4	1	..	..	..	..	..						
Charbar (25)	100	0	0	40	..	4	37	26	2	..	..	4	5	..	2	2	..	..	..	29	..	1	..	..	1	1	..	..	..	..	..						
Gwador (22)	52	31	17	5	..	7	8	20	5	5	10	..	..	..	..	..	..	..	..	18	..	1	..	..	1	1	..	..	..	..	..						
Pasni (10)	66	23	11	20	..	..	10	32	88	10	..	..	..	..	..	..	..	..	..	45	..	1	..	..	1	1	..	..	..	..	..						
Ormaara (15)	90	10	0	7	..	3	8	13	2	13	23	8	..	..	..	..	..	..	..	31	..	1	..	..	2	3	..	..	..	..	..						
Drigh Road (77)	54	34	12	24	..	..	..	..	..	21	66	5	..	..	..	..	..	..	..	8	..	1	..	..	2	2	..	..	..	..	..	..					

ψ = Duststorm; ≡ = Fog; K = Thunderstorm; R = Rain; Sq. = Squall; ∞ = Dusthaze.

## CLIMATOLOGICAL TABLES.

TABLE IX—September.

STATION.	Bar. reduced to 32° F. and standard gravity.	AIR TEMPERATURE—°F.						Air density gms./in. <sup>3</sup>	R. H. (Percentage).	Vapour tension.	CLOUDS.										RAIN.		VISIBILITY.					
		Wet bulb.		Max.		Min.					Percentage frequency of total cloud amount.						Mean amount.		Percentage frequency of low cloud.				Total monthly (ins.).	No. of rainy days.	Maximum in 24 hrs.	Percentage frequency.		
		(1)	(2)	(3)	(4)	(5)	(6)				(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
Bushire (14)	29-69 29-65	86 92	79 85	94 102	83 74	83 74	74	1144 1127	72 74	-877 -1070	0-6 0-3	87 92	4 6	6 0	2 0	1 2	0-3 0-1	0 0	0 0	0 0	0 0	1 2	..	..	..	4 4	7 2	89 94
Bahrain (8)	29-71 29-66	86 92	79 81	97 105	79 73	79 73	73	1142 1128	73 60	-899 -903	0-7 0-1	78 93	3 7	5 0	0 0	0 0	0-3 0-0	0 0	0 0	0 0	0 0	..	..	..	..	7 3	85 74	8 23
Lingeh (20)	29-67 29-61	88 92	83 82	96 101	80 73	80 73	73	1135 1126	76 63	-1026 -950	1-1 0-6	84 75	24 20	7 4	4 1	0 0	0-6 0-3	22 22	3 1	0 0	0 0	..	..	..	..	1 1	9 13	90 86
Honjam (100)	29-63 29-55	87 90	82 82	96 102	82 77	82 77	77	1136 1127	80 71	-1033 -980	1-2 0-3	82 79	24 19	8 1	3 0	2 1	0-9 0-3	21 12	7 0	2 0	1 1	..	..	..	..	0 0	15 17	83 85
Muscat (20)	29-69 29-63	84 87	78 80	94 104	80 73	80 73	73	1148 1138	76 72	-876 -914	1-2 0-3	72 73	16 19	6 7	6 1	0 0	0-5 0-3	12 8	1 2	0 0	0 0	..	..	..	..	0 0	59 62	41 38
Jask (13)	29-71 29-64	85 88	76 81	93 103	80 75	80 75	75	1147 1135	67 70	-797 -937	0-8 0-3	86 95	0 2	7 2	7 1	0 0	0-1 0-1	0 0	0 0	0 0	0 0	..	..	..	..	1 0	38 40	61 60
Charbar (25)	29-75 29-67	82 82	77 79	87 101	76 70	76 70	70	1154 1150	78 84	-875 -955	3-4 1-7	28 48	27 32	24 13	17 7	4 0	2-4 1-3	22 28	19 10	9 3	4 0	..	..	..	..	0 0	24 23	76 77
Gwador (22)	29-74 29-66	79 81	74 75	88 103	73 69	73 69	69	1161 1154	78 76	-780 -795	6-0 2-6	22 42	7 25	12 16	15 5	43 12	5-9 2-5	8 25	12 14	15 10	42 7	..	..	..	..	2 0	88 84	10 16
Pasni (10)	29-75 29-67	80 76	74 74	88 104	72 66	72 66	66	1160 1156	76 86	-760 -867	4-3 1-3	34 65	13 24	14 2	17 3	21 6	2-5 0-8	11 19	12 0	8 1	11 4	..	..	..	..	3 0	95 100	
Ornara (15)	29-75 29-68	80 74	74 75	88 106	75 67	75 67	67	1160 1157	77 80	-771 -813	3-7 1-5	25 53	33 32	20 12	18 3	3 0	3-6 1-4	32 29	20 12	18 3	3 0	..	..	..	..	0 0	17 25	83 75
Drigh Road (77)	29-69 29-63	81 75	75 81	91 105	75 66	75 66	66	1156 1153	73 76	-769 -797	5-8 3-9	15 14	15 30	25 14	25 7	25 7	5-2 3-0	15 40	18 15	23 12	22 7	..	..	..	..	0 0	15 15	85 93

Figures in brackets under the stations indicate height of barometer cistern above sea-level in feet.

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[illegible]

☁ = Duststorm; ☁ = Fog; ☁ = Thunderstorm; ☁ = Rain; ☁ = Squall; ☁ = Dusthaze.

## CLIMATOLOGICAL TABLES.

TABLE X—October.

STATION.	Bar. reduced to 32°F and Standard Gravity.	AIR TEMPERATURE—°F.						Air density gms./m <sup>3</sup> .	R. H. (Percentage).	Vapour tension.	CLOUDS.										RAIN.			VISIBILITY.			
		Max.			Wet bul.	Dry bul.	Percentage frequency of total cloud amount.						Percentage frequency of low cloud.				Total monthly (ins.).	No. of rainy days.	Maximum in 24 hrs.	Percentage frequency.							
		Mean.	Highest.	Mean.			Lowest.				of low cloud.																
											Mean amount.	No. cloud.	1-3	4-6	7-9	10				Mean amount.	1-3	4-6	7-9	10	0-3	4-6	7-9
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)
Bahire (14)	29-88	78	70	88	97	75	65	1172	68	.850	0-6	90	2	3	5	0	0-3	0	4	0	1	..	..	..	2	3	95
Bahrain (8)	29-83	85	78					1150	73	.883	0-9	85	4	7	3	1	0-5	0	4	1	1	..	..	..	1	1	98
Bahrain (8)	29-88	81	75	91	101	75	67	1162	75	.787	0-6	85	8	3	2	3	0-2	2	0	0	2	..	..	..	0	73	27
Bahrain (8)	29-83	86	77					1155	63	.786	0-9	83	6	6	2	3	0-1	2	2	0	0	..	..	..	0	48	52
Linceh (20)	29-83	83	76	91	101	73	62	1166	71	.821	1-1	63	26	8	3	0	0-2	11	0	0	0	..	..	..	0	0	100
Linceh (20)	29-77	86	79					1145	68	.868	0-9	66	25	5	4	0	0-2	13	0	0	0	..	..	..	0	2	98
Henjam (100)	29-79	83	79	91	99	79	73	1152	81	.825	1-7	53	29	10	3	5	1-2	22	8	1	4	..	..	..	0	0	100
Henjam (100)	29-72	86	79					1144	76	.910	1-7	57	27	3	8	10	1-1	25	2	1	6	..	..	..	0	0	100
Muscat (20)	29-84	82	74	93	104	79	72	1159	68	.736	0-7	74	17	9	0	0	0-3	11	2	0	0	..	..	..	6	55	45
Muscat (20)	29-79	86	77					1148	63	.838	1-3	70	9	16	5	0	0-4	9	4	0	0	..	..	..	0	61	39
Jask (13)	29-86	81	75	91	97	76	71	1162	73	.782	0-4	94	1	2	2	1	0-1	0	1	2	0	..	..	..	0	8	92
Jask (13)	29-80	85	78					1149	72	.877	0-6	90	3	2	2	0	0-2	0	1	2	0	..	..	..	1	17	82
Charbar (35)	29-89	81	76	88	95	74	67	1162	79	.832	2-4	53	18	10	16	3	1-9	15	12	11	2	..	..	..	0	12	88
Charbar (35)	29-82	83	79					1155	82	.823	1-0	72	19	5	3	1	0-4	14	3	0	0	..	..	..	0	6	94
Gwador (22)	29-87	79	75	89	97	73	62	1166	80	.801	3-9	39	16	13	11	21	3-5	16	12	11	18	..	..	..	8	55	37
Gwador (22)	29-78	82	76					1157	75	.811	1-2	76	16	3	4	1	0-4	14	3	1	0	..	..	..	0	48	52
Pasul (10)	29-89	79	73	90	98	70	58	1168	77	.766	2-5	57	17	6	8	13	1-9	15	8	8	6	..	..	..	3	11	86
Pasul (10)	29-81	79	76					1162	86	.858	0-4	83	16	0	0	1	0-3	12	0	0	1	..	..	..	0	69	31
Ormara (15)	29-87	80	73	89	99	72	58	1166	74	.741	1-6	60	21	11	6	2	1-3	14	10	6	0	..	..	..	2	18	80
Ormara (15)	29-80	81	75					1160	74	.773	0-5	56	11	0	0	3	0-2	10	0	0	0	..	..	..	2	18	80
Brigh Road (17)	29-80	79	73	93	106	71	60	1164	75	.735	2-4	52	21	11	8	3	1-8	21	8	6	5	..	..	..	3	19	78
Brigh Road (17)	29-75	82	73					1154	78	.819	2-2	63	26	6	2	3	0-9	19	2	2	3	..	..	..	3	19	78

Figures in brackets under the stations indicate height of barometer station above sea-level in feet.

## CLIMATOLOGICAL TABLES.

TABLE X—October—continued.

STATION.	STATE OF SEA.			Ht. of anemometer, ft. above ground.	Mean average wind velocity M. P. H.	PERCENTAGE FREQUENCY OF WINDS.																WEATHER REMARKS.								
	Percentage frequency.					Velocity 4-15 M. P. H.								Velocity 16-31 M. P. H.																
	Sm	Mod	Ro			N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW						Vel. less than M. P. H.	Number of occasions of		
																						☉	☾	☾☉	K	R		Sq	∞	
	(29)	(30)	(31)	(32)	(33)	(34)	(55)	(36)	(37)	(38)	(39)	(40)	(41)	(42)	(43)	(44)	(45)	(46)	(47)	(48)	(49)	(50)	(51)	(52)	(53)	(54)	(55)	(56)		
Bushire (14)	100	0	0	49	5.1	15	6	6	1	5	1	4	22	50	1	..	..	..	..	..	..	69	1	1	..	..	1	1		
Bahrain (8)	99	0	1	36	4.7	23	8	8	2	..	2	2	16	11	2	..	..	..	..	..	3	68	1	2	1	1	4	3		
Iluech (20)	—	—	—	23	5.0	2	19	22	2	1	1	28	25	2	..	..	..	..	..	..	4	48	1	..	..	..	1	1		
Henjam (100)	92	5	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	53	1	..	..	..	1	1		
Henjam (100)	86	8	6	41	5.5	3	33	1	1	1	8	33	10	2	..	..	..	..	..	..	..	48	1	..	..	..	1	1		
Muscat (20)	99	0	1	..	..	1	..	2	1	1	33	10	2	..	..	..	..	..	..	..	..	79	..	..	..	..	..	1		
Muscat (20)	98	2	0	40	3.3	1	3	38	4	..	..	..	..	12	..	..	..	..	..	..	46	..	..	..	..	..	..	1		
Jask (13)	95	5	0	..	..	..	..	5	3	..	..	..	..	7	..	..	..	..	..	..	..	79	..	..	..	..	..	1		
Jask (13)	94	5	1	35	6.7	3	9	32	12	6	17	9	20	6	..	6	1	..	..	..	1	42	1	1	1	..	2	1		
Charbar (25)	83	17	0	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	30	..	..	..	..	..	..	1		
Charbar (25)	100	0	0	40	4.4	..	7	10	3	2	2	1	16	4	..	..	..	..	..	..	..	60	..	2	..	..	..	1		
Gwador (22)	99	1	0	..	..	..	..	11	15	25	4	2	..	..	..	..	..	..	..	..	43	..	..	..	..	..	..	1		
Gwador (22)	99	1	0	5	4.8	..	5	8	1	4	10	41	22	..	..	..	..	1	..	..	..	52	1	0	..	..	1	2		
Pasni (10)	99	1	0	20	6.0	10	9	10	3	4	4	20	28	..	..	..	..	..	..	..	..	16	1	5	..	..	2	1		
Pasni (10)	98	2	0	..	..	..	1	1	1	31	43	4	..	..	..	..	..	..	..	1	..	17	..	..	..	..	..	1	3	
Ormaria (15)	100	0	0	7	6.6	..	..	2	2	..	10	24	2	..	..	..	..	..	..	..	..	61	2	5	..	..	1	3		
Ormaria (15)	100	0	0	..	..	..	..	2	2	..	29	42	..	..	..	..	..	..	3	..	..	23	..	..	..	..	..	..	3	
Drigh Road (17)	100	0	0	24	5.8	5	13	2	2	..	3	39	6	3	..	..	..	..	..	..	..	32	..	3	..	1	1	3	3	
Drigh Road (17)	100	0	0	..	..	..	..	..	..	..	46	40	..	..	..	..	..	..	..	..	..	6	..	..	..	..	..	..	..	

☉ = Duststorm; ☾ = Fog; K = Thunderstorm; R = Rain; Sq = Squall; ∞ = Dusthaze.

## CLIMATOLOGICAL TABLES.

TABLE XI.—November.

STATION.	AIR TEMPERATURE—°F.							Bar. reduced to 32° F. and gravity.	CLOUDS.							RAIN.			VISIBILITY.										
	Max.			Min.			Dry bulb.		Percentage frequency of cloud amount.				Mean total amount.	Percentage frequency of low cloud amount.				Total monthly (ins.).	No. of rainy days.	Maximum in 24 hrs.	Percentage frequency.								
	Wet bulb.	Mean.	Lowest.	Wet bulb.	Mean.	Lowest.			No cloud.	1-3 (13)	4-6 (15)	7-9 (16)		10 (17)	Mean amount of low cloud.	1-3 (19)	4-6 (20)					7-9 (21)	10 (22)						
																								(3)	(4)	(5)	(6)	(7)	(8)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)
Bushire (14)	30-02 29-97	67 75	61 63	77 83	93 93	63 63	50	1203 1182	69 70	473 610	2-6 2-8	65 59	2 3	11 12	12 15	10 9	1-6 2-0	0 0	6 3	12 16	2 6	2 6	3 0-65	3 0	0 0	1 0	99 100	0 0	1 0
Bahrain (8)	30-02 29-97	73 76	67 69	81 85	95 95	88 85	55	1189 1180	74 67	599 602	2-8 2-6	50 48	17 25	13 13	8 9	12 9	1-6 1-6	8 13	5 3	2 8	3 8	..	..	2-76	0 0	85 45	55 55	0 0	35 45
Lingeh (20)	29-96 29-91	71 77	66 71	83 83	93 93	85 85	53	1187 1174	70 73	564 682	2-0 2-6	45 41	34 29	8 13	10 16	2 1	0-6 1-1	32 50	1 4	0 0	0 0	..	..	0-11	0 0	100 97	0 0	3 3	97 97
Henjam (100)	29-92 29-86	74 78	68 70	83 86	91 94	89 73	61	1180 1171	75 66	636 626	1-7 4-1	47 52	36 23	7 8	4 13	7 13	1-2 1-4	31 22	3 1	0 6	8 8	..	..	0-29	0 0	95 99	0 0	4 4	95 99
Muscat (20)	29-93 29-91	75 80	68 71	86 80	94 94	73 70	64	1182 1168	69 62	596 629	2-7 2-8	39 44	31 18	14 19	15 20	0 0	0-9 0-9	18 14	0 5	4 4	0 0	1	1	2-10	0 1	62 67	33 32	0 1	83 82
Jask (13)	30-00 29-94	74 79	64 70	85 84	91 97	89 86	61	1187 1173	59 63	499 610	1-4 0-9	79 81	2 4	13 7	1 1	0 0	0-4 0-6	2 4	4 4	0 0	0	1	1	0-30	0 0	6 8	94 92	0 0	6 8
Charbar (26)	30-01 29-94	75 77	68 73	84 84	97 97	86 86	57	1184 1178	73 82	619 777	1-4 1-0	72 70	10 19	9 7	6 3	3 0	0-7 0-2	6 2	4 1	4 0	0	1	1	0-20	0 0	72 73	78 78	0 0	72 73
Gwador (22)	29-98 29-91	75 77	67 68	84 85	95 95	85 85	55	1183 1176	69 67	600 599	1-6 1-9	49 65	17 15	12 9	9 9	0 0	0-6 0-7	12 7	2 6	3 3	3 3	1	1	0-65	2 0	28 30	70 70	0 0	99 99
Fasni (10)	30-00 29-98	74 75	65 69	85 85	96 95	84 85	53	1187 1181	62 75	511 602	2-2 1-4	56 74	23 12	6 3	6 2	10 7	0-7 0-9	21 10	2 6	3 2	4 2	1	1	2-00	1 0	0 27	99 73	0 0	99 73
Omara (15)	29-98 29-92	74 77	67 70	85 85	95 95	85 85	53	1186 1176	71 69	586 631	1-8 1-8	42 63	28 18	12 7	12 5	7 7	1-0 0-8	10 5	3 2	5 5	2 5	1	1	0-45	0 0	5 5	95 95	0 0	5 5
Drigh Road (27)	29-93 29-87	70 76	64 67	87 87	97 97	81 81	51	1192 1176	62 66	431 569	5-0 3-7	28 33	20 7	17 12	28 18	1-2 1-0	12 10	2 0	8 7	0 7	8 7	2	2	0-85	0 0	2 2	98 95	0 0	2 5

Figures in brackets under the stations indicate height of barometer cistern above sea level in feet.

## CLIMATOLOGICAL TABLES.

TABLE XI—November—concluded.

STATION.	STATE OF SEA.			Ht. of anemometer, ft. above ground.	Mean average wind velocity M. P. H. (33)	PERCENTAGE FREQUENCY OF WINDS.										WEATHER REMARKS.												
	Percentage frequency.					Velocity 4-15 M. P. H.										Velocity 16-31 M. P. H.		Number of occasions of										
	Sm (29)	Mod (30)	Ro (31)			N (34)	NE (35)	E (36)	SE (37)	S (38)	SW (39)	W (40)	NW (41)	N (42)	NE (43)	E (44)	SE (45)	S (46)	SW (47)	W (48)	NW (49)	Vol. less than 4 M. P. H. (50)	4 (51)	5 (52)	6 (53)	7 (54)	8 (55)	9 (56)
Bushire (14)	100	0	0	49	4.1	3	9	4	4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Bahrain (8)	98	2	0	36	4.7	2	1	4	9	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Lincoln (20)	—	—	—	23	4.9	7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Hendham (100)	93	2	4	41	4.9	11	17	7	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Muscat (20)	94	1	4	41	4.9	11	17	7	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Jask (13)	93	3	3	40	3.0	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Charbar (25)	99	1	0	40	4.3	13	11	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Gwador (22)	96	4	0	5	3.3	1	13	8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Pasni (10)	100	0	0	20	5.2	24	12	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Ormara (15)	100	0	0	7	4.2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Dag Road (77)	100	0	0	24	4.4	22	8	8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	

☛ = Duststorm; ☙ = Fog; ☛ = Thunderstorm; R = Rain; Sq. = Squall; ∞ = Dusthaze.

☛ = Duststorm; ☛ = Fog; ☛ = Thunderstorm; R = Rain; Sg. = Squall; ☛ = Dusthaze.

## CLIMATOLOGICAL TABLES.

TABLE XII—December.

STATION.	AIR TEMPERATURE.—°F.							Bar. reduced to 32° and standard gravity.	Dry bulb.	Wet bulb.		Max.		Min.	AIR DENSITY gms./cu. in.				W. H. (Percentage).	Vapour tension.	CLOUDS.							RAIN.					VISIBILITY.					
	Bar. reduced to 32° and standard gravity.	Dry bulb.	Wet bulb.	Mean.		High heat.	Mean.			Lowest.	Air density gms./cu. in.	W. H. (Percentage).	Vapour tension.		Percentage frequency of total cloud amount.						Mean amount.	Percentage frequency of low cloud amount.				Total monthly (in.).	No. of rainy days.	Maximum in 24 hrs.	Percentage frequency.									
				No cloud.	1-3										4-6	7-9	10	1-3				4-6	7-9	10														
																									(13)					(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)											
Bushire (14)	30-07	57	55	67	77	54	45	1229	84	399	2-9	00	6	8	11	15	23	0	0	14	12	415	6	240	4	9	87											
Bahrein (8)	30-04	65	60			75		1210	75	480	3-2	52	4	22	13	10	23	0	0	14	9				0	2	98											
Bahrein (8)	30-03	62	59	71	83	59	51	1218	82	461	4-4	24	30	5	20	19	30	19	11	8	14	083	2	0-78	0	52	48											
Muscat (20)	30-06	61	58	72	84	57	47	1218	82	449	3-8	19	41	12	18	10	17	59	4	2	2	2-70	4	245	0	3	97											
Hehlan (100)	29-36	67	62			79		1199	79	528	3-5	27	34	14	13	12	20	54	10	3	4				0	2	98											
Muscat (20)	29-06	64	61	73	81	61	51	1208	70	483	4-2	26	32	8	14	20	28	33	5	0	14	2-69	6	1-69	0	8	92											
Muscat (20)	29-92	63	63			72		1195	70	500	3-1	35	27	15	8	15	24	34	14	2	10	1-99	3	2-25	2	58	40											
Jask (13)	30-01	70	63	78	91	68	62	1197	72	511	4-1	16	34	19	26	4	15	25	14	3	0				3	71	26											
Charbar (25)	29-39	66	61	76	83	63	52	1207	68	481	2-5	66	4	10	11	10	13	8	11	0	1-04	3	1-05	0	4	96												
Gwadar (22)	30-06	66	61	76	86	61	46	1208	74	484	2-5	59	16	3	4	17	14	19	3	12	1	2-11	4	0-92	0	10	90											
Pasni (10)	30-00	71	65			72		1193	72	540	2-8	57	13	4	8	18	1-6	11	4	10	4				0	17	83											
Ormara (15)	30-04	64	61	75	84	60	45	1204	66	458	4-0	35	19	13	11	22	1-7	25	4	2	3	6-32	4	5-31	0	26	74											
Ormara (15)	29-98	63	60	75	86	59	42	1218	72	461	3-3	42	19	10	16	13	15	18	4	4	6	3-20	3	2-63	0	29	71											
Ormara (15)	30-00	65	63			75		1200	75	524	2-5	59	15	4	6	15	13	10	3	5	8				0	24	93											
Ormara (15)	30-05	65	59	75	83	67	46	1210	66	427	2-5	53	19	5	3	14	13	10	3	6	3-17	3	2-94	0	7	93												
High Road (77)	30-00	58	51	79	87	52	39	1226	60	395	2-9	52	16	6	11	16	0-5	6	5	0	3	0-93	1	0-60	5	3	90											
	29-94	67	58			65		1201	65	371	2-4	51	23	8	8	10	0-3	5	2	0	2				5	3	90											

Figures in brackets under the stations indicate height of barometer cistern above sea-level in feet.

TABLE XII—December—concluded.

STATION.	STATE OF SEA.			Ht. of anemometer ft. above ground.	Mean average wind velocity M. P. H.	PERCENTAGE FREQUENCY OF WINDS.																WEATHER REMARKS.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
	Percentage frequency.					Velocity 4-15 M. P. H.								Velocity 16-31 M. P. H.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
	Sm	Mod	Ro			N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	(29)	(30)	(31)			(32)	(33)	(34)	(35)	(36)	(37)	(38)	(39)	(40)	(41)	(42)	(43)	(44)	(45)	(46)	(47)		(48)	(49)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
Bushire (14)	96	2	2	49	7.1	13	13	12	5	2	..	..	3	..	..	..	1	..	..	..	50	..	4	2	6	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..

∞ = Dust haze.

Sq = Squall;

R = Rain,

K = Thunderstorm;

Fog;

∞ = Just at rim;

### UPPER WIND-FREQUENCY.

**TABLE XIII—January.**

STATION.	Speed limits K m/hr.	Number of observa- tions.	PERCENTAGE OF OBSERVATIONS AT 500 METRES.								Number of observa- tions.	PERCENTAGE OF OBSERVATIONS AT 1,000 METRES.									
			N	NE	E	SE	S	SW	W	NW		5 Km. per hr. or less.	N	NE	E	SE	S	SW	W	NW	5 Km. per hr. or less.
Bahrain 26° 00' N 50° 35' E	6-25 26-50 51-75	55	11 27 4	4	2	7 5 2	4 5 4	4 4	4 4	5 4 5	4	52	8 4 5	10	6	10 11 2	8 6	6	11 4	2	
Batt-al-Falaj (Muscat) 23° 37' N 58° 36' E	6-25 26-50 51-75	50	3	3	9 2	15	3	2	17 3	10	57	9	2 2	14 3	5 2	3	7	19 2	18 7	7	
Jask 25° 45' N 57° 45' E	6-25 26-50 51-75	30	3	7	3	13 3	3	7	23 8	..	80	..	..	7	3	..	20	26	33 20	..	
Gwador 25° 07' N 62° 20' E	6-25 26-50 51-75	60	7 2	20 3	8 2	2 2	3 3	13 3	12 10	5	59	9 14	10 2	9	2 2	3	9 2	15 9	9 5	3	
Drigh Road (Karachi) 24° 50' N 67° 04' E	6-25 26-50 51-75	111	12 8 4 1	14 9 6 1	10 6 5	3 1	3 1	..	6 5	3	109	11 2	11 5 1	8 2	5 1	3	7	17 5	15 4 1	3	
PERCENTAGE OF OBSERVATIONS AT 2,000 METRES.																					
Bahrain. 26° 00' N 50° 35' E	6-25 26-50 51-75	45	2	4	..	..	7 4	13 18	4 18	2	35	..	..	..	..	8 3	6 11	11 23	17 16	..	
Batt-al-Falaj (Muscat) 23° 37' N 58° 36' E	6-25 26-50 51-75	49	4	6	2	..	4 4	12 4	20 14	3	47	2	2	..	..	2 4	9 4	17 28	19 4	..	
Jask 25° 45' N 57° 45' E	6-25 26-50 51-75	27	..	7	4	..	..	..	11 37	..	25	..	..	..	4	..	4	20 28	8 7	..	
Gwador 25° 07' N 62° 20' E	6-25 26-50 51-75	53	8	2	2	..	2	2	15 19	2	45	..	2	..	..	2	4	28 24	8 7	..	
Drigh Road (Karachi) 24° 50' N 67° 04' E	6-25 26-50 51-75	105	14 1	6 1	4	..	5 7 1	4 7 1	11 15	2	94	3 6	1	2	..	..	5 6	8 28	7 12	..	

UPPER WIND FREQUENCY.  
TABLE XIV—February.

STATION.	Speed Limits km/hr.	PERCENTAGE OF OBSERVATIONS AT 500 METRES.										Number of observa- tions.	PERCENTAGE OF OBSERVATIONS AT 1,000 METRES.									
		N	NE	E	SE	S	SW	W	NW	5 Km. per hr. or less.	N		NE	E	SE	S	SW	W	NW	5 Km. per hr. or less.		
Bahrain 26° 00' N 50° 35' E	0-25	10	4	..	..	6	4	2	2	2	50	6	4	..	..	6	6	10	2			
	26-50	22	..	..	..	10	..	..	6	6	8	6	..	..	20	2	..	8	8			
	51-75	4	..	..	..	16	..	..	4	4	..	8	..	..	6	..	..	4	4			
	> 75	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..			
	6-25	52	..	..	..	6	11	17	15	15	50	..	..	10	14	..	22	6	10			
Bait-al-Falaj (Muscat) 23° 37' N 53° 36' E	0-25	4	..	..	..	6	..	..	..	..	26	..	..	..	..	..	..	..	..			
	26-50	2	..	..	..	2	6	6	2	2	..	..	..	..	8	4	10	2	2			
	51-75	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..			
	> 75	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..			
	6-25	28	11	18	4	4	7	7	11	4	26	12	8	12	4	4	15	19	4			
Jask 25° 45' N 57° 45' E	0-25	14	4	..	..	..	..	..	..	..	54	..	..	..	..	..	..	..	..			
	26-50	4	..	..	..	..	..	..	..	..	7	4	4	..	2	..	..	..	..			
	51-75	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..			
	> 75	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..			
	6-25	56	7	4	5	11	7	23	5	5	54	7	4	4	7	2	22	13	4			
Gwadar 25° 07' N 62° 20' E	0-25	2	5	..	..	..	..	..	..	..	105	..	..	..	..	..	..	..	..			
	26-50	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..			
	51-75	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..			
	> 75	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..			
	6-25	107	8	8	8	..	1	15	21	..	105	8	7	12	6	2	11	16	5			
High Road (Karachi) 24° 50' N 67° 04' E	0-25	2	1	..	..	..	..	3	..	..	..	..	..	..	..	..	..	..	..			
	26-50	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..			
	51-75	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..			
	> 75	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..			
	6-25	42	..	2	2	2	9	14	9	..	32	..	..	..	..	3	9	6	..			
Bahrain 26° 00' N 50° 35' E	0-25	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..			
	26-50	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..			
	51-75	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..			
	> 75	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..			
	6-25	45	9	..	9	7	4	11	15	..	41	5	5	2	5	2	5	19	..			
Bait-al-Falaj (Muscat) 23° 37' N 53° 36' E	0-25	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..			
	26-50	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..			
	51-75	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..			
	> 75	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..			
	6-25	26	4	..	4	4	12	12	15	6	24	4	4	..	..	4	13	17	4			
Jask 25° 45' N 57° 45' E	0-25	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..			
	26-50	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..			
	51-75	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..			
	> 75	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..			
	6-25	45	..	2	4	2	15	12	15	..	49	3	8	..	..	10	13	13	..			
Gwadar 25° 07' N 62° 20' E	0-25	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..			
	26-50	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..			
	51-75	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..			
	> 75	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..			
	6-25	103	1	6	4	3	3	13	15	1	95	1	4	..	..	6	11	15	..			
High Road (Karachi) 24° 50' N 67° 04' E	0-25	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..			
	26-50	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..			
	51-75	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..			
	> 75	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..			
	6-25	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..			

## UPPER WIND FREQUENCY.

TABLE XV—March.

Station	Speed K.m/hr.	PERCENTAGE OF OBSERVATIONS AT 500 METRES.								Number of observa- tions.	PERCENTAGE OF OBSERVATIONS AT 1,000 METRES.								5 Km. per hr. or less.
		N	NE	E	SE	S	SW	W	NW		N	NE	E	SE	S	SW	W	NW	
Bahrain 26° 00' N 50° 35' E	6-25 26-50 51-75	9 21 13	2 .. ..	.. 2 ..	4 5 ..	11 4 2	2 4 2	4 .. ..	4 2 4	4	9 13 9	.. .. ..	2 .. ..	6 .. ..	6 8 4	6 6 4	6 2 ..	11 6 ..	2
Bait-al-Falaj (Muscat) 23° 37' N 58° 36' E	6-25 26-50 51-75	47 .. ..	.. .. ..	2 .. ..	2 .. ..	9 .. ..	13 .. ..	43 15 ..	9 4 ..	2	47 .. ..	2 .. ..	2 .. ..	4 .. ..	4 .. ..	9 2 2	23 19 2	13 16 2	4
Jaak 25° 45' N 57° 45' E	6-25 26-50 51-75	17 18 ..	.. .. ..	.. .. ..	6 .. ..	.. .. ..	6 .. ..	13 18 ..	35 18 ..	..	17 .. ..	.. .. ..	.. .. ..	.. .. ..	12 .. ..	12 .. ..	18 23 ..	18 23 ..	6
Gwador 25° 07' N 62° 20' E	6-25 26-50 51-75	59 .. ..	12 2 ..	.. .. ..	2 2 ..	3 .. ..	5 2 ..	14 7 3	9 10 ..	3	58 .. ..	3 3 ..	.. .. ..	7 .. ..	5 2 ..	3 .. ..	14 22 7	5 16 3	2
Drigh Road (Karachi) 24° 50' N 67° 04' E	6-25 26-50 51-75	114 3 ..	10 6 ..	3 .. ..	.. .. ..	.. .. ..	2 .. ..	10 22 3	17 10 2	..	113 9 4	7 1 ..	7 3 ..	4 .. ..	3 .. ..	3 1 ..	9 14 5	13 11 2	2
Bahrain 26° 00' N 50° 35' E	6-25 26-50 51-75	44 .. ..	.. .. ..	.. .. ..	2 .. ..	2 .. ..	14 23 2	14 14 2	9 9 7	2	32 .. ..	.. .. ..	.. .. ..	.. .. ..	6 3 ..	6 6 ..	13 28 6	6 6 ..	..
Bait-al-Falaj (Muscat) 23° 37' N 58° 36' E	6-25 26-50 51-75	41 .. ..	6 .. ..	12 .. ..	2 .. ..	2 .. ..	2 .. ..	12 24 2	15 7 7	5	38 .. ..	3 .. ..	5 .. ..	5 .. ..	3 .. ..	3 .. ..	13 29 13	5 8 3	..
Jaak 25° 45' N 57° 45' E	6-25 26-50 51-75	17 12 ..	.. .. ..	.. .. ..	.. .. ..	.. .. ..	6 12 2	.. 29 ..	18 18 ..	..	16 .. ..	.. .. ..	.. .. ..	.. .. ..	.. .. ..	.. 13 ..	37 19 ..	19 .. ..	..
Gwador 25° 07' N 62° 20' E	6-25 26-50 51-75	43 .. ..	6 .. ..	2 .. ..	6 .. ..	.. .. ..	2 .. ..	18 17 13	15 10 4	4	38 .. ..	.. .. ..	5 .. ..	.. .. ..	.. .. ..	5 .. ..	13 24 11	8 3 ..	..
Drigh Road (Karachi) 24° 50' N 67° 04' E	6-25 26-50 51-75	108 2 ..	9 .. ..	5 .. ..	4 .. ..	4 .. ..	9 1 2	14 15 7	8 11 ..	1	98 5 2	7 2 ..	1 .. ..	2 .. ..	3 .. ..	4 2 1	17 14 15	6 9 2	1

## UPPER WIND FREQUENCY.

TABLE XVI—April.

STATION.	Speed limits Km./hr.	PERCENTAGE OF OBSERVATIONS AT 500 METRES.										PERCENTAGE OF OBSERVATIONS AT 1,000 METRES.									
		Number of observa- tions.	N	NE	E	SE	S	SW	W	NW	5 Km. per hr. or less.	Number of observa- tions.	N	NE	E	SE	S	SW	W	NW	5 Km. per hr. or less.
Bahrain 26° 00' N 50° 35' E	6-25 26-50 51-75	45	7 15 11	4 4 2	2 4 2	2 4 2	11 7 3	9 2 2	2 .. ..	7 2 2	..	41	5 12 5	2 2 ..	2 .. ..	10 10 ..	5 .. ..	19 .. ..	5 .. ..	5 .. ..	2
Bah-al-Fala (Muscat) 23° 37' N 58° 30' E	6-25 26-50 51-75	60	2 2 2	.. .. ..	.. .. ..	2 .. ..	3 .. ..	17 85 7	18 .. ..	.. .. ..	3	59	2 2 2	2 .. ..	2 .. ..	2 .. ..	.. .. ..	12 15 2	29 15 2	.. .. ..	3
Jask 23° 45' N 57° 45' E	6-25 26-50 51-75	22	.. .. ..	.. .. ..	.. .. ..	.. .. ..	.. .. ..	.. .. ..	.. .. ..	.. .. ..	..	22	.. .. ..	.. .. ..	.. .. ..	.. .. ..	.. .. ..	.. .. ..	.. .. ..	.. .. ..	..
Gwader 25° 07' N 62° 20' E	6-25 26-50 51-75	59	2 3 3	2 2 2	2 .. ..	3 .. ..	6 .. ..	19 27 5	27 .. ..	7 5 ..	2	59	5 5 5	3 2 ..	2 .. ..	3 .. ..	.. .. ..	7 8 15	15 19 15	.. .. ..	3
Drish Road (Karachi) 24° 50' N 67° 04' E	6-25 26-50 51-75	113	2 2 1	2 2 2	1 .. ..	.. .. ..	.. .. ..	3 .. ..	10 85 6	14 21 2	1	110	4 3 3	3 1 ..	3 .. ..	1 .. ..	.. .. ..	5 11 23	11 23 6	.. .. ..	..
Bahrain 26° 00' N 50° 35' E	6-25 26-50 51-75	37	3 8 5	3 .. ..	3 .. ..	5 .. ..	11 5 ..	11 13 ..	3 .. ..	13 3 3	..	30	10 3 3	3 .. ..	3 .. ..	3 .. ..	13 13 7	13 10 ..	7 3 ..	3 3 ..	..
Bah-al-Fala (Muscat) 23° 37' N 58° 30' E	6-25 26-50 51-75	56	1 1 4	9 .. ..	2 .. ..	2 .. ..	2 .. ..	4 .. ..	13 5 ..	27 11 5	2	51	25 2 ..	22 .. ..	2 .. ..	.. .. ..	.. .. ..	6 6 ..	6 10 ..	.. .. ..	..
Jask 23° 45' N 57° 45' E	6-25 26-50 51-75	22	.. .. ..	.. .. ..	.. .. ..	.. .. ..	.. .. ..	.. .. ..	.. .. ..	.. .. ..	..	20	.. .. ..	.. .. ..	.. .. ..	.. .. ..	.. .. ..	.. .. ..	.. .. ..	.. .. ..	10
Gwader 25° 07' N 62° 20' E	6-25 26-50 51-75	44	18 .. ..	.. .. ..	2 .. ..	2 .. ..	.. .. ..	2 .. ..	14 16 2	27 11 ..	2	38	.. .. ..	.. .. ..	.. .. ..	.. .. ..	.. .. ..	8 8 5	5 5 5	.. .. ..	..
Drish Road (Karachi) 24° 50' N 67° 04' E	6-25 26-50 51-75	102	10 1 ..	1 .. ..	4 .. ..	3 .. ..	3 1 ..	7 2 ..	11 21 8	18 9 ..	3	93	12 2 1	7 8 ..	7 .. ..	8 .. ..	1 .. ..	3 12 7	5 14 1	.. .. ..	1

PERCENTAGE OF OBSERVATIONS AT 2,000 METRES.

PERCENTAGE OF OBSERVATIONS AT 3,000 METRES.

UPPER WIND FREQUENCY.  
TABLE XVII—May.

STATION.	Speed limits km/hr.	Number of observa- tions.	PERCENTAGE OF OBSERVATIONS AT 500 METRES.								Number of observa- tions.	PERCENTAGE OF OBSERVATIONS AT 1,000 METRES.								5 Km. per hr. or less.
			N	NE	E	SE	S	SW	W	NW		5 Km. per hr. or less.	N	NE	E	SE	S	SW	W	
Bahrein 20° 00' N 50° 35' E	6-25 26-50 51-75	44	18 18	5 2	5	2 2	7	..	5	9 16	5	41	2 5	..	7	10 2	7	10 15	..	..
Bait-al-Falaj (Muscat) 23° 37' N 58° 36' E	6-25 26-50 51-75	58	5 2	..	2	..	5	..	24 7	14 2	2	60	7 2	..	3	13 2	25 2	12 2	..	5
Jask 25° 45' N 57° 45' E	6-25 26-50 51-75	31	7 3	3 10	19	..	..	..	3 7	26 13 3	7	31	3 3	..	3	7 13	10 3	23 19	..	7
Gwador 25° 07' N 62° 20' E	6-25 26-50 51-75	62	3 2	3 2	..	3	5	..	11 3 3	2 7	..	57	5 7	..	2	2 2	18 39 6	9 9	..	..
Drigh Road (Karachi) 24° 50' N 67° 04' E	6-25 26-50 51-75	105	1 3	..	..	1	..	..	2 6 8	7 18 ..	..	92	4 8	1	..	1 8	8 24 4	3 3	..	..
Bahrein 20° 00' N 50° 35' E	6-25 26-50 51-75	86	8 17	6 ..	3 ..	6 ..	..	..	6 11	14 17 6	3	33	12 12	..	6 3	6 3	9 9 3	8 24 3	..	..
Bait-al-Falaj (Muscat) 23° 37' N 58° 36' E	6-25 26-50 51-75	59	5 ..	7 2	5 ..	3 ..	9	..	17 20	12 9	7	54	5 2	..	4 7	2 2	24 19 2	13 5 2	4	..
Jask 25° 45' N 57° 45' E	6-25 26-50 51-75	31	10 8	13 3	3 ..	3 ..	3	..	23 7	10 10	7	31	16 ..	10 8	7 3	16 7	16 10	10 ..	..	..
Gwador 25° 07' N 62° 20' E	6-25 26-50 51-75	32	9 3	..	3 ..	3 ..	3	..	22 19 3	19 13 3	..	26	19 8	..	4 ..	4 ..	19 11 4	11 ..	..	..
Drigh Road (Karachi) 24° 50' N 67° 04' E	6-25 26-50 51-75	76	9 ..	1 ..	..	3 ..	3	..	11 24 3	20 22 5	..	60	7 5	..	2 ..	5 ..	13 10 ..	30 18 2	2	..



UPPER WIND FREQUENCY.  
TABLE XIX—July.

STATION.	Speed limits Km./hr.	Number of observa- tions.	PERCENTAGE OF OBSERVATIONS AT 500 METRES.								Number of observa- tions.	PERCENTAGE OF OBSERVATIONS AT 1,000 METRES.									
			N	NE	E	SE	S	SW	W	NW		5 Km. per hr. or less.	N	NE	E	SE	S	SW	W	NW	5 Km. per hr. or less.
Bahrain 26° 00' N 50° 35' E	6-25	40	7	3	3	3	3	5	13	3	34	6	3	3	3	3	3	3	3	6	
	26-50	25	25	25	25	25	25	25	25	25	25	26	21	13	8	8	15	7	23	5	
	51-75	58	10	5	9	9	2	5	19	26	61	13	5	8	3	8	8	15	23	5	
	6-25	26-50	10	5	9	9	2	5	19	26	2	2	2	2	2	2	2	2	2	2	
	23° 37' N 58° 30' E	51-75	31	10	10	13	10	3	3	32	31	8	13	6	3	6	6	10	29	3	
Jask 25° 45' N 57° 45' E	6-25	31	10	10	13	10	3	3	32	31	8	13	6	3	6	6	10	29	3		
	26-50	25	25	25	25	25	25	25	25	25	25	26	21	13	8	8	15	7	23	5	
	51-75	62	5	2	5	19	19	23	10	5	37	13	3	3	3	8	16	11	19	13	
	6-25	26-50	5	2	5	19	19	23	10	5	5	13	3	3	3	8	16	11	19	13	
	23° 07' N 62° 20' E	51-75	101	21	1	1	1	2	14	2	68	4	1	1	1	6	21	9	35	4	
Drigh Road (Karachi) 24° 50' N 67° 04' E	6-25	101	21	1	1	1	2	14	2	2	1	4	1	1	1	6	21	9	35	4	
	26-50	25	25	25	25	25	25	25	25	25	25	26	21	13	8	8	15	7	23	5	
	51-75	28	10	5	9	9	2	5	19	26	2	2	2	2	2	2	2	2	2	2	
	6-25	26-50	10	5	9	9	2	5	19	26	2	2	2	2	2	2	2	2	2	2	
	23° 50' N 67° 04' E	51-75	28	10	5	9	9	2	5	19	26	2	2	2	2	2	2	2	2	2	
Bahrain 26° 00' N 50° 35' E	6-25	26	27	8	8	8	4	4	27	11	23	13	4	9	4	9	9	22	4	3	
	26-50	25	27	8	8	8	4	4	27	11	23	13	4	9	4	9	9	22	4	3	
	51-75	57	21	9	9	9	7	7	11	16	47	15	17	9	2	4	4	6	11	4	
	6-25	26-50	21	9	9	9	7	7	11	16	3	13	3	10	3	17	27	10	7	3	
	23° 37' N 58° 30' E	51-75	30	13	7	13	13	13	17	13	30	10	13	3	8	17	27	10	7	3	
Jask 25° 45' N 57° 45' E	6-25	30	13	7	13	13	13	13	17	13	30	10	13	3	8	17	27	10	7	3	
	26-50	25	25	25	25	25	25	25	25	25	25	26	21	13	8	8	15	7	23	5	
	51-75	30	27	20	3	3	3	3	3	17	3	22	36	5	5	5	5	9	32	9	
	6-25	26-50	27	20	3	3	3	3	3	17	3	22	36	5	5	5	5	9	32	9	
	23° 07' N 62° 20' E	51-75	34	12	9	6	6	6	9	18	26	15	15	4	4	4	4	15	16	8	4
Drigh Road (Karachi) 24° 50' N 67° 04' E	6-25	34	12	9	6	6	6	6	9	18	26	15	15	4	4	4	4	15	16	8	4
	26-50	25	25	25	25	25	25	25	25	25	25	26	21	13	8	8	15	7	23	5	
	51-75	28	10	5	9	9	2	5	19	26	2	2	2	2	2	2	2	2	2	2	
	6-25	26-50	10	5	9	9	2	5	19	26	2	2	2	2	2	2	2	2	2	2	
	23° 50' N 67° 04' E	51-75	28	10	5	9	9	2	5	19	26	2	2	2	2	2	2	2	2	2	

**TABLE XX--August.**

STATION.	Speed limits Km/hr.	Number of observa- tions.	PERCENTAGE OF OBSERVATIONS AT 500 METRES.								5 Km. per hr. or less.	Number of observa- tions.	PERCENTAGE OF OBSERVATIONS AT 1,000 METRES.							
			N	NE	E	SE	S	SW	W	NW			N	NE	E	SE	S	SW	W	NW
Bahrain 26° 00' N 50° 35' E	6-25 26-50 51-75 > 75	45	13	11	2	2	..	..	11	20 13 2	2	41	12 5	2	..	7	5	..		
Bahrain 26° 00' N 50° 35' E	6-25 26-50 51-75 > 75	11	7	4	..	..	..	..	..	13	..	..	..	..	..	..	..	..		
Bahrain 26° 00' N 50° 35' E	6-25 26-50 51-75 > 75	55	6	9	7	15	..	4	20	11	29	58	7 3	3	3	21	3	..		
Bahrain 26° 00' N 50° 35' E	6-25 26-50 51-75 > 75	30	10	10	23	7	..	7	10	7	..	28	4	..	4	14	11	..		
Bahrain 26° 00' N 50° 35' E	6-25 26-50 51-75 > 75	35	..	3	9	29	23	11	6	..	17	22	9	18	9	5	9	..		
Bahrain 26° 00' N 50° 35' E	6-25 26-50 51-75 > 75	115	1	1	..	..	..	5	12	7	..	74	4	..	1	18	13	..		
Bahrain 26° 00' N 50° 35' E	6-25 26-50 51-75 > 75	36	19	11	8	3	3	..	3	11	..	32	9	9	9	3	6	..		
Bahrain 26° 00' N 50° 35' E	6-25 26-50 51-75 > 75	59	19	14	9	2	..	..	7	29	2	56	21	9	2	2	4	4		
Bahrain 26° 00' N 50° 35' E	6-25 26-50 51-75 > 75	25	10	12	..	..	8	12	20	4	12	28	17	4	4	13	9	4		
Bahrain 26° 00' N 50° 35' E	6-25 26-50 51-75 > 75	8	23	13	13	13	..	..	..	..	..	6	17	..	..	..	17	17		
Bahrain 26° 00' N 50° 35' E	6-25 26-50 51-75 > 75	38	11	16	6	..	3	..	11	13	3	27	7	4	..	..	4	4		

UPPER WIND FREQUENCY.  
TABLE XXI—September.

STATION.	Speed limits Km/hr.	PERCENTAGE OF OBSERVATIONS AT 500 METRES.									Number of observa- tions.	PERCENTAGE OF OBSERVATIONS AT 1,000 METRES.								
		N	NE	E	SE	S	SW	W	NW	5 Km. per hr. or less.		N	NE	E	SE	S	SW	W	NW	5 Km. per hr. or less.
Bahrain 26° 00' N 50° 35' E	0-25 26-50 51-75 > 75	47	9 4 4	6 .. ..	9 .. ..	6 .. ..	9 .. ..	13 .. ..	28 4 ..	2	47	9 2 ..	6 4 ..	.. .. ..	.. .. ..	.. .. ..	4 .. ..	15 2 ..	4	
Bait-al-Fakaj (Muscat) 23° 37' N 58° 36' E	0-25 26-50 51-75 > 75	58	12 .. ..	2 3 ..	5 5 ..	5 .. ..	2 .. ..	31 .. ..	24 .. ..	15	62	7 .. ..	3 .. ..	.. .. ..	.. .. ..	5 5 ..	5 .. ..	31 3 ..	5	
Jask 25° 45' N 57° 45' E	0-25 26-50 51-75 > 75	30	10 .. ..	27 3 ..	13 7 ..	10 3 ..	.. .. ..	3 .. ..	13 .. ..	10	25	24 2 ..	4 .. ..	.. .. ..	.. .. ..	.. .. ..	12 .. ..	20 .. ..	4	
Gwador 25° 07' N 62° 20' E	0-25 26-50 51-75 > 75	27	4 4 ..	11 .. ..	7 .. ..	7 .. ..	15 .. ..	51 .. ..	15 4 ..	4	23	17 4 ..	30 .. ..	.. .. ..	9 .. ..	.. .. ..	4 .. ..	4 .. ..	9	
Drigh Road (Karachi) 24° 50' N 67° 04' E	0-25 26-50 51-75 > 75	127	2 1 1	8 2 ..	.. .. ..	2 .. ..	3 47 4	30 .. ..	6 .. ..	..	102	5 2 ..	1 .. ..	.. .. ..	3 10 1	1 20 4	23 20 1	0 4 ..	2	
PERCENTAGE OF OBSERVATIONS AT 2,000 METRES.																				
Bahrain 26° 00' N 50° 35' E	0-25 26-50 51-75 > 75	45	17 16 2	18 2 ..	4 4 ..	4 .. ..	2 .. ..	2 .. ..	7 9 ..	..	41	12 2 ..	10 2 ..	12 .. ..	5 .. ..	.. .. ..	2 .. ..	5 5 ..	2	
Bait-al-Fakaj (Muscat) 23° 37' N 58° 36' E	0-25 26-50 51-75 > 75	60	42 15 ..	20 10 ..	7 2 ..	.. .. ..	.. .. ..	5 .. ..	.. .. ..	..	55	25 38 2	4 4 5	.. .. ..	.. .. ..	.. .. ..	.. .. ..	2 .. ..	..	
Jask 25° 45' N 57° 45' E	0-25 26-50 51-75 > 75	25	8 .. ..	12 .. ..	8 .. ..	4 .. ..	.. .. ..	32 .. ..	4 .. ..	8	24	13 4 ..	4 .. ..	.. .. ..	13 .. ..	.. .. ..	4 .. ..	8 4 ..	4	
Gwador 25° 07' N 62° 20' E	0-25 26-50 51-75 > 75	20	40 .. ..	15 .. ..	20 .. ..	5 .. ..	.. .. ..	5 .. ..	.. .. ..	..	18	6 44 ..	.. .. ..	.. .. ..	.. .. ..	.. .. ..	.. .. ..	17 .. ..	..	
Drigh Road (Karachi) 24° 50' N 67° 04' E	0-25 26-50 51-75 > 75	76	17 7 1	13 11 ..	8 3 ..	7 1 ..	3 .. ..	3 .. ..	8 7 ..	..	63	17 23 6	10 10 ..	3 .. ..	8 .. ..	.. .. ..	3 1 ..	4 1 ..	..	



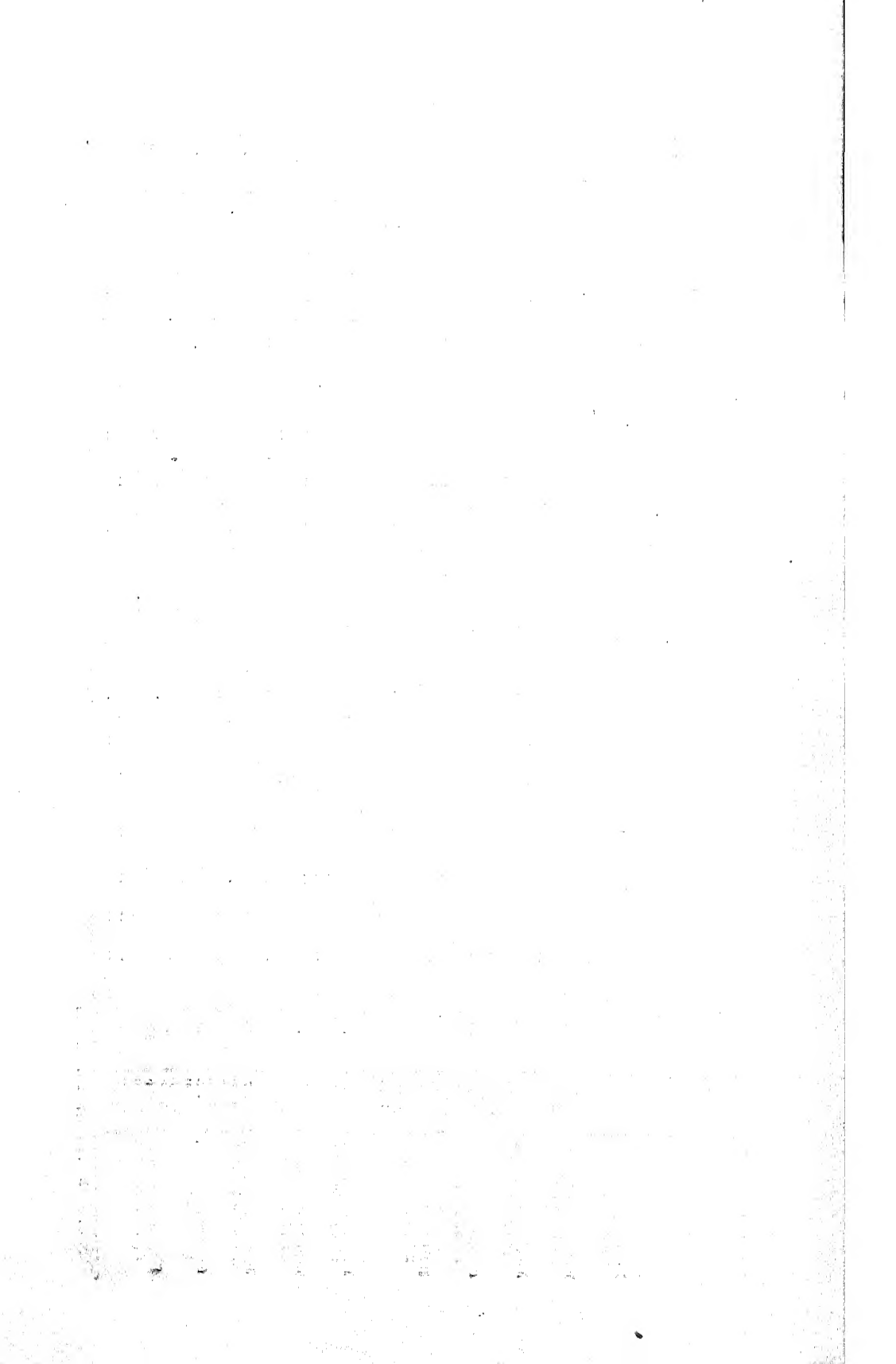


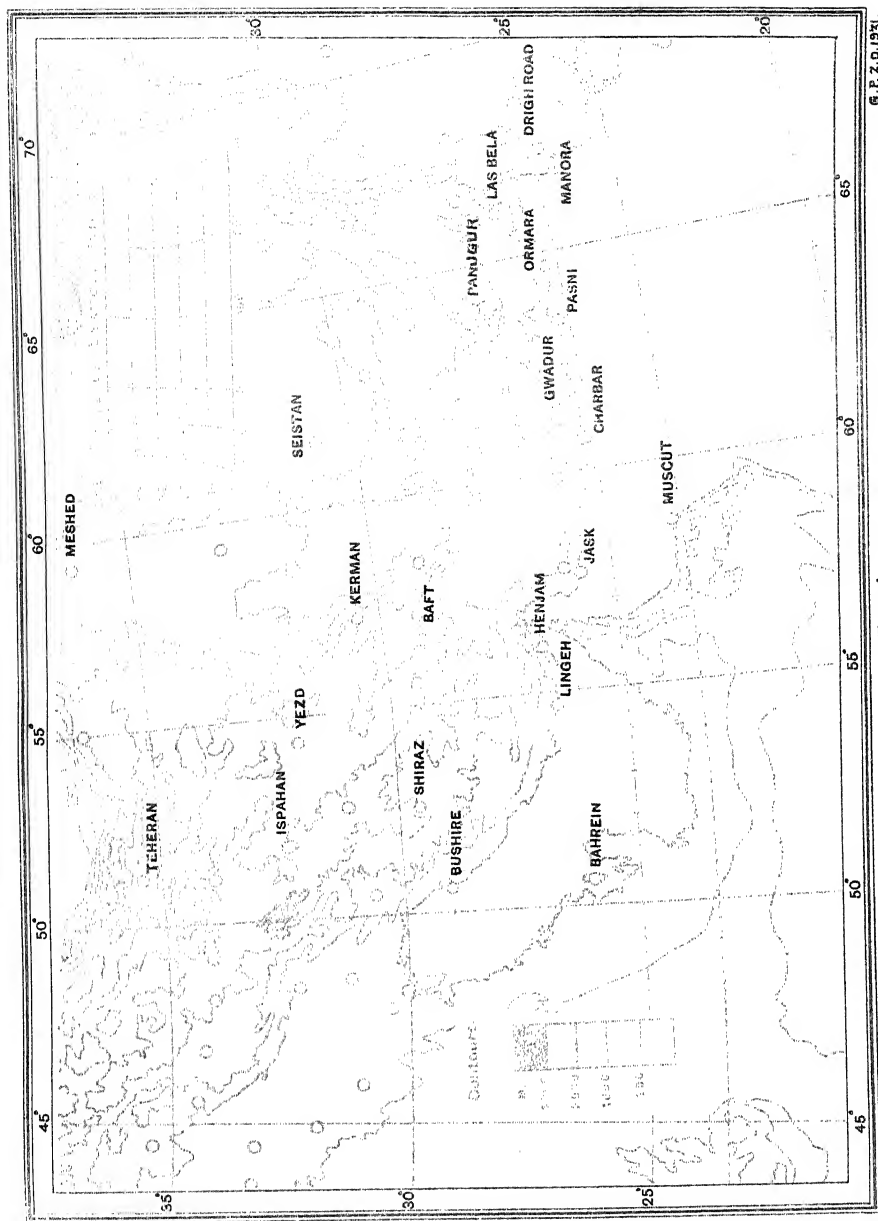
# UPPER WIND FREQUENCY.

TABLE XXIV—December.

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STATION.	Speed limits Km./hr.	Number of observa- tions.	PERCENTAGE OF OBSERVATIONS AT 500 METRES.								Number of observa- tions.	PERCENTAGE OF OBSERVATIONS AT 1,000 METRES.								
			N	NE	E	SE	S	SW	W	NW		5 Km. per hr. or less.	N	NE	E	SE	S	SW	W	NW
Bahrain . . . 26° 00' N 50° 35' E	6-25 26-50 51-75	67	10 22 1	.. .. ..	.. .. ..	1 .. ..	10 3 3	9 .. ..	3 1 ..	10 16 5	..	9 12 1	3 1 ..	1 .. ..	6 3 3	6 5 3	.. 5 ..	17 20 1	1	1
Bait-al-Falaj (Muscat) 23° 37' N 58° 36' E	6-25 26-50 51-75	77	7 7 1	7 7 ..	7 7 ..	8 .. ..	1 5 1	4 1 ..	17 5 1	12 10 1	8	9 9 3	9 11 1	11 .. ..	3 .. ..	.. 5 ..	1 1 ..	22 5 ..	9	9
Jask . . . 25° 45' N 57° 45' E	6-25 26-50 51-75	80	8 .. ..	10 .. ..	7 .. ..	20 13 ..	3 .. ..	3 .. ..	10 .. ..	20 3 ..	3	.. .. ..	7 .. ..	7 .. ..	11 4 ..	4 4 ..	7 .. ..	14 .. ..	7	7
Gwador . . . 25° 07' N 62° 20' E	6-25 26-50 51-75	87	8 2 ..	14 5 ..	15 1 ..	7 2 ..	2 .. ..	5 .. ..	11 2 ..	13 2 ..	10	6 5 ..	7 6 ..	8 .. ..	8 .. ..	9 1 ..	5 1 ..	12 1 ..	12	12
Drigh Road (Karachi) 24° 50' N 67° 04' E	6-25 26-50 51-75	154	14 2 ..	15 23 6	8 5 1	5 1 ..	1 .. ..	.. .. ..	7 1 ..	7 1 ..	5	17 1 ..	16 7 1	13 5 ..	4 1 ..	.. 3 ..	4 .. ..	16 1 ..	3	3
Bahrain . . . 26° 00' N 50° 35' E	6-25 26-50 51-75	52	4 8 2	6 2 ..	2 .. ..	6 .. ..	6 .. ..	2 8 ..	8 11 6	10 17 6	2	5 9 ..	2 .. ..	.. .. ..	7 .. ..	5 2 ..	11 23 5	5 16 7	5	5
Bait-al-Falaj (Muscat) 23° 37' N 58° 36' E	6-25 26-50 51-75	69	16 1 ..	7 1 ..	9 1 ..	1 .. ..	4 .. ..	6 .. ..	15 4 ..	23 9 ..	1	10 7 ..	9 .. ..	2 .. ..	2 .. ..	3 3 ..	10 13 3	23 18 2	..	..
Jask . . . 25° 45' N 57° 45' E	6-25 26-50 51-75	23	9 .. ..	.. .. ..	4 .. ..	.. .. ..	4 4 ..	13 4 ..	13 9 ..	35 .. ..	4	5 .. ..	5 .. ..	.. .. ..	.. .. ..	.. .. ..	27 31 5	18 .. ..	..	..
Gwador . . . 25° 07' N 62° 20' E	6-25 26-50 51-75	82	7 2 ..	2 5 ..	2 .. ..	4 2 ..	12 .. ..	9 .. ..	15 13 ..	19 2 ..	4	3 4 ..	1 .. ..	1 .. ..	.. .. ..	6 7 ..	18 14 8	15 17 1	..	..
Drigh Road (Karachi) 24° 50' N 67° 04' E	6-25 26-50 51-75	150	14 2 1	21 3 ..	5 2 ..	6 .. ..	5 1 ..	9 2 1	7 1 ..	6 1 ..	5	4 2 1	4 1 ..	4 .. ..	1 .. ..	10 9 1	12 10 3	13 18 2	2	2





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FIG. 1



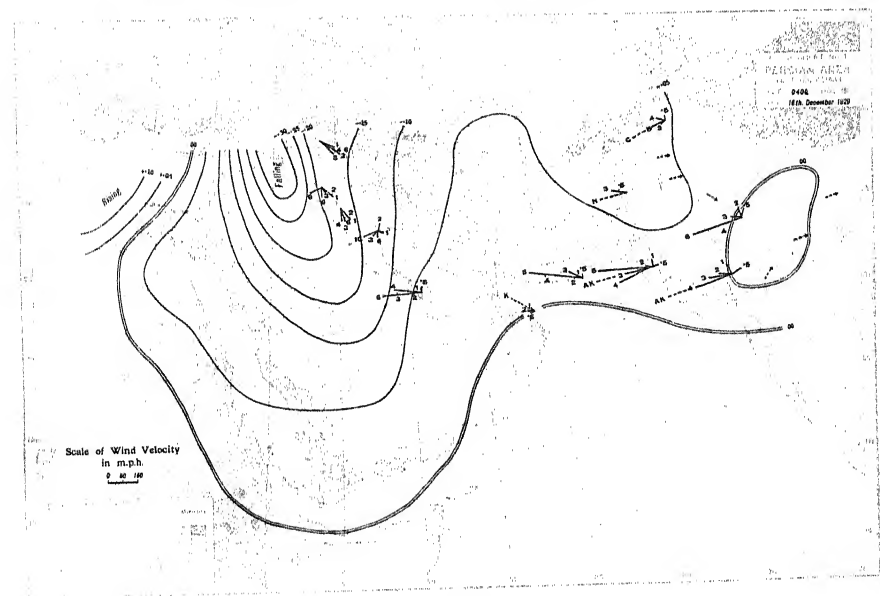
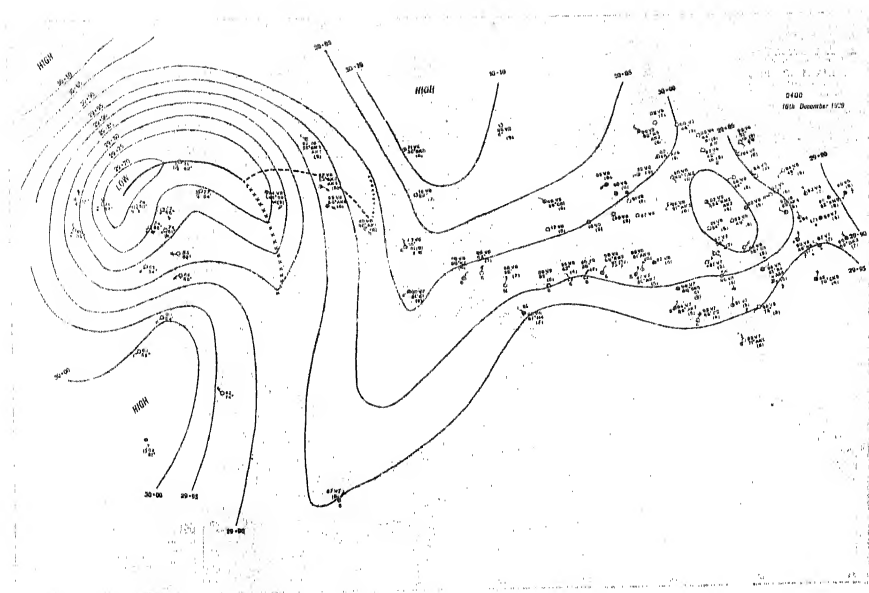


FIG 2







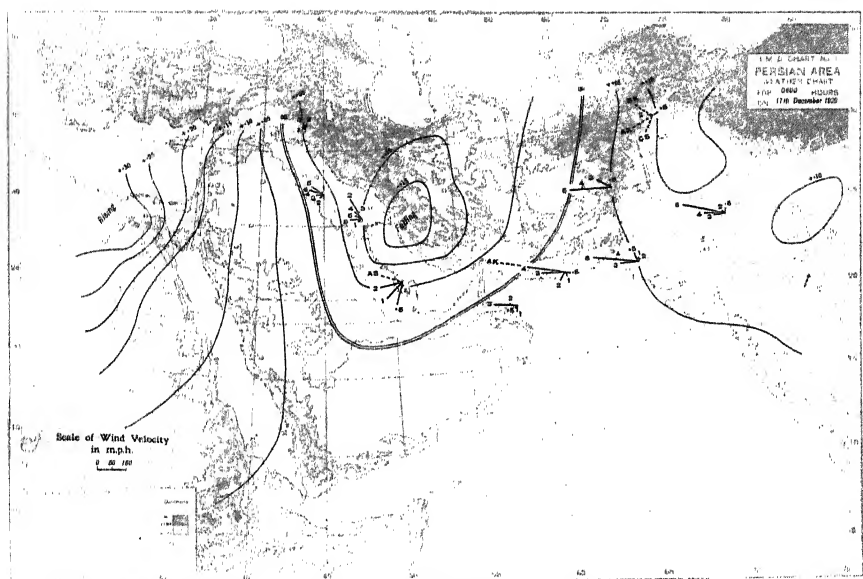
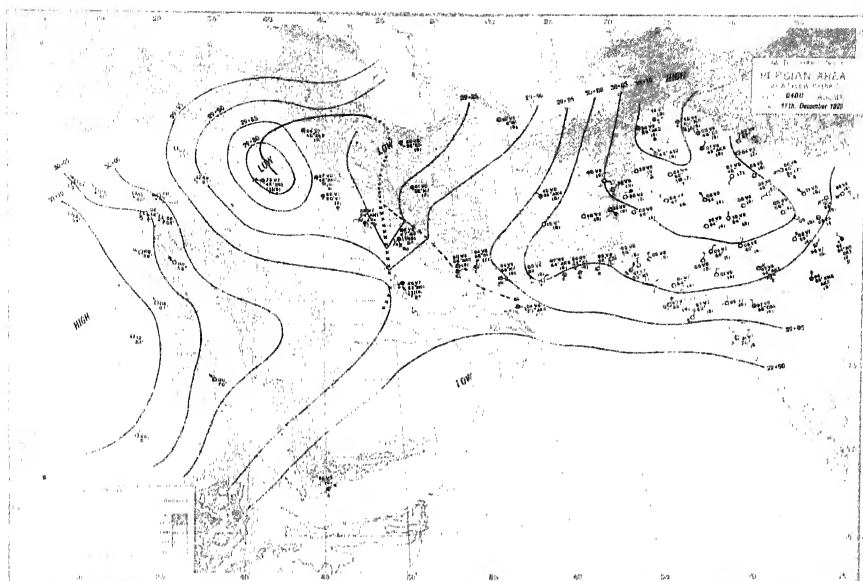


FIG. 4



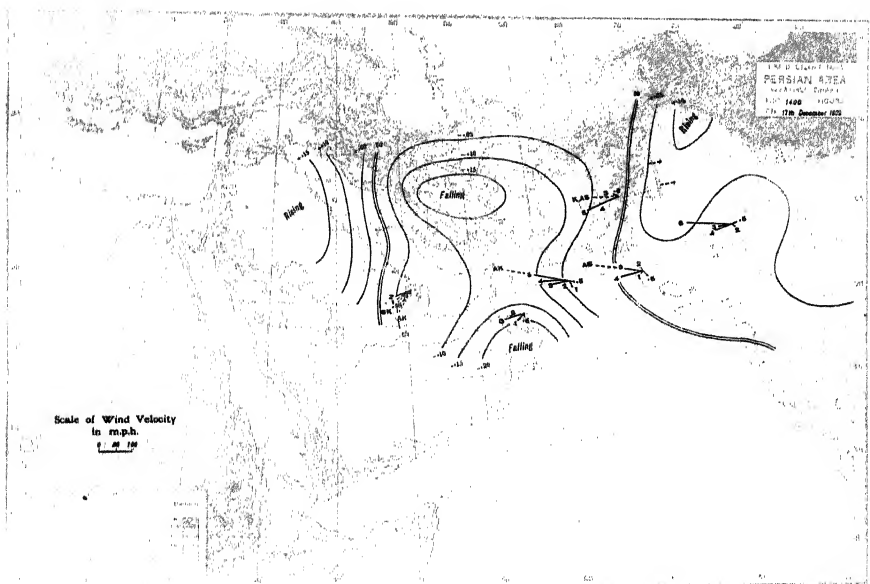
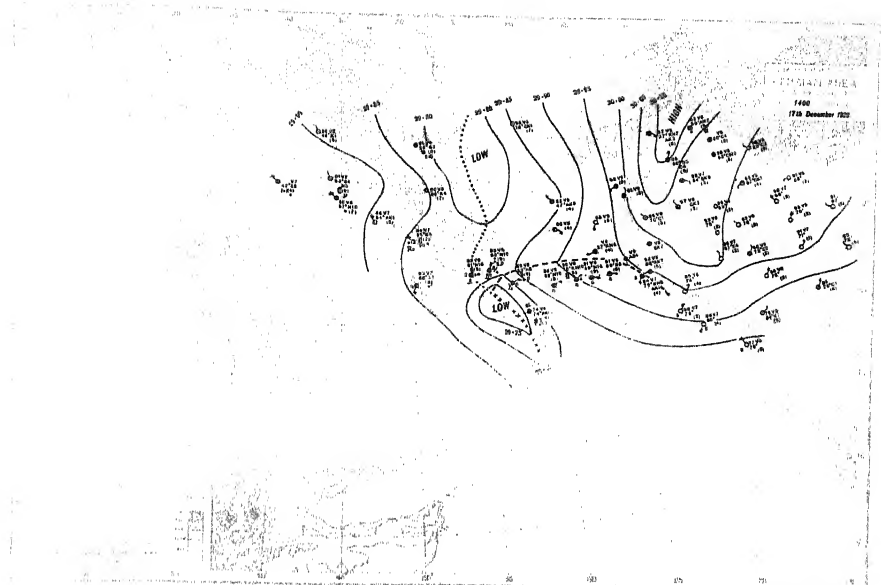


FIG. 5



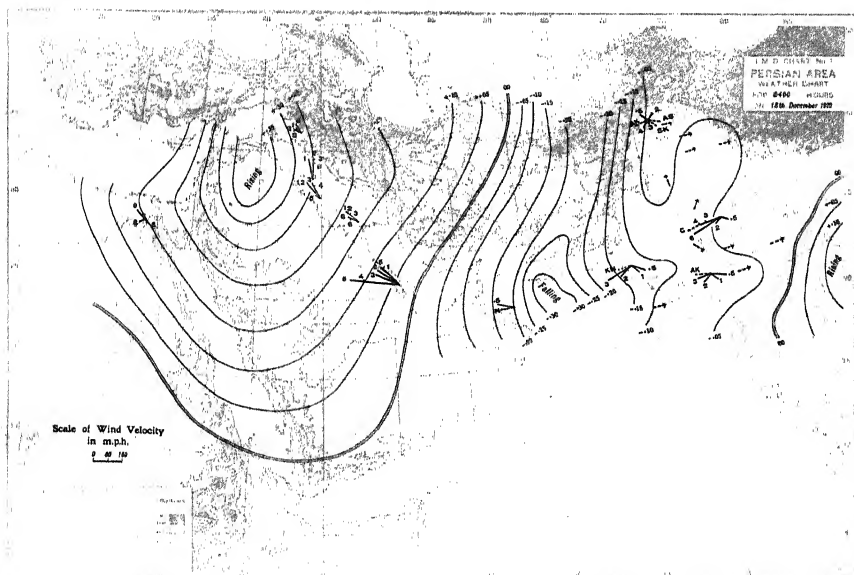
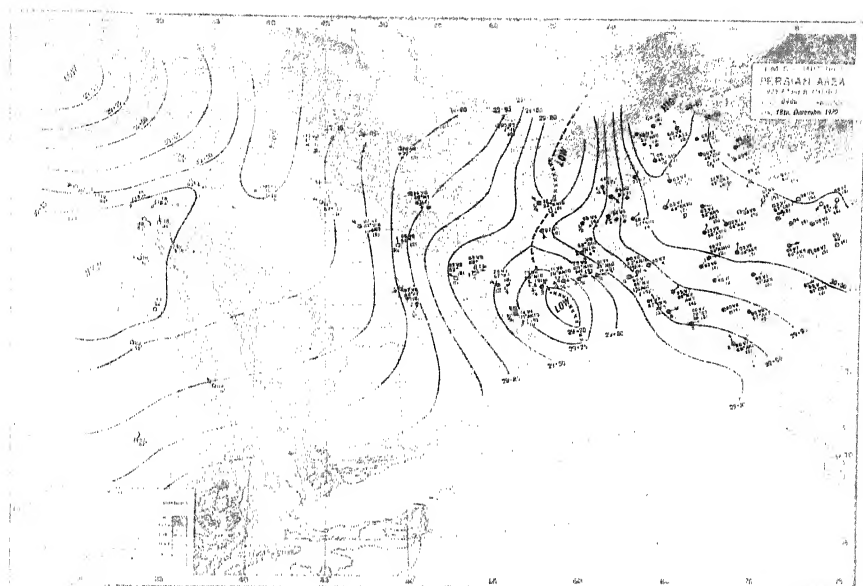


FIG. 6







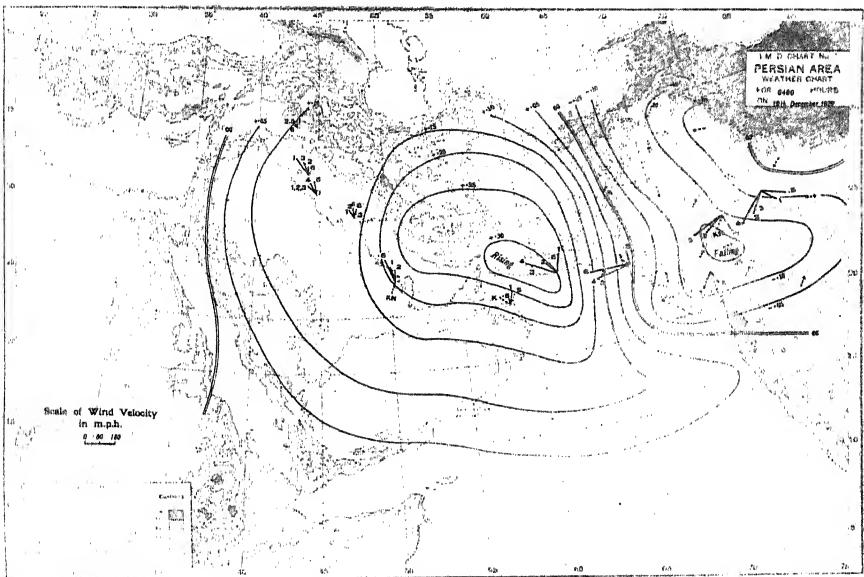
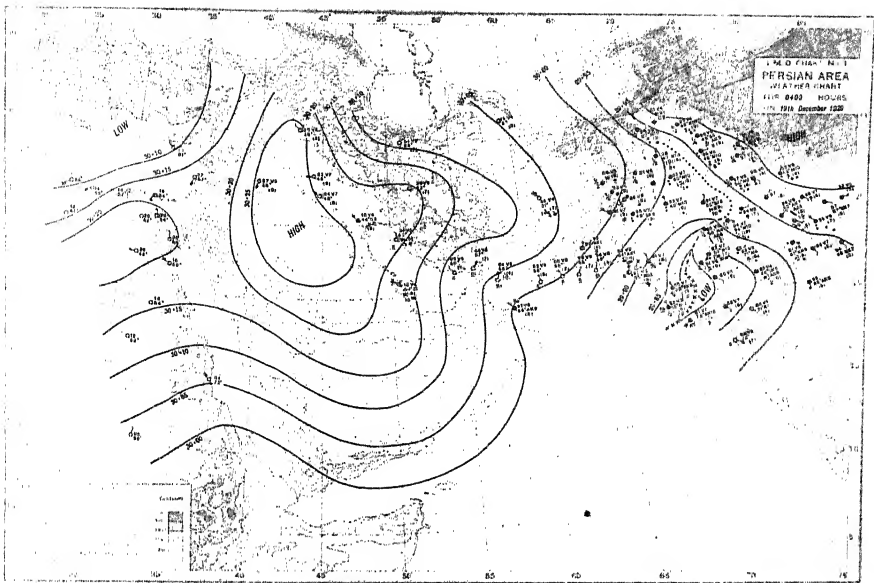


FIG 1



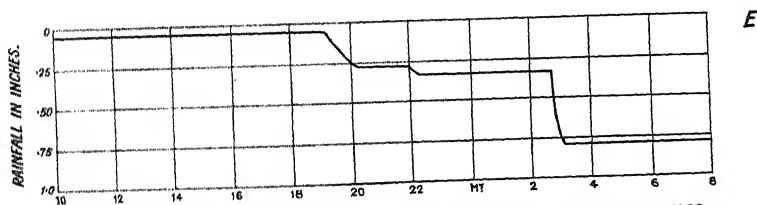
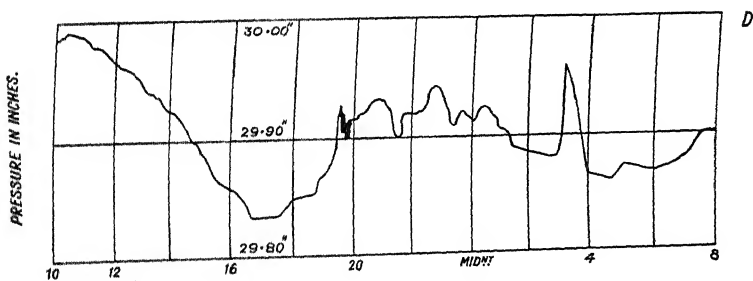
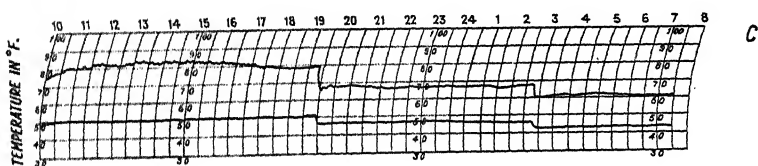
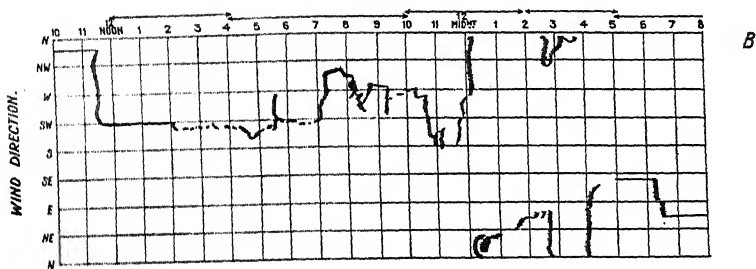
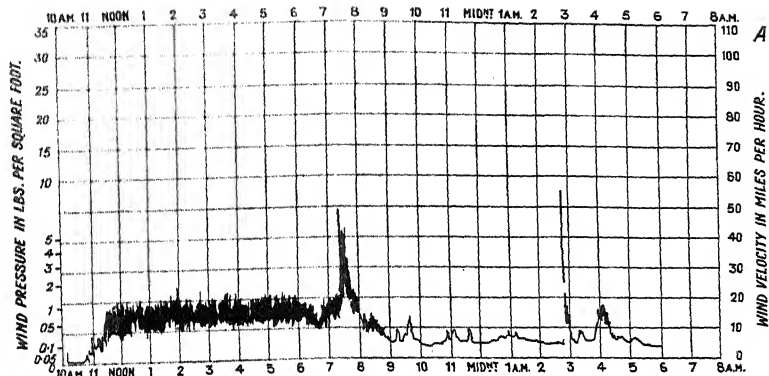


FIG. 9. RECORDS OF AUTOGRAPHIC INSTRUMENTS FOR 27<sup>TH</sup>—28<sup>TH</sup> NOVEMBER 1928.